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OF THE

Field Naturalists' Club of Victoria.

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ILLUSTRATIONS.

ERRATA.

Page 83, line 11 from bottom—For "Grass-Parrakeet, *Neophema elegans*," read "Rosella Parrakeet, *Platycercus eximius*."

Page 94, line 3—For "Woodlands" read "Wildwood."

Page 99, line 28—For "*retinoides*" read "*retinodes*."

Page 137, line 26—For "Mr. H. B. Williamson" read "Mr. A. Vroland."

The Victorian Naturalist.

Vol. XXXII.—No. 1. MAY 6, 1915. No. 377.

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday, 12th April, 1915.

In the absence of the president, Dr. C. S. Sutton, one of the vice-presidents, occupied the chair, and about 30 members and visitors were present.

REPORT.

A report of the excursion to Williamstown Back Beach on Saturday, 13th March, was given by the acting leader, Mr. F. Chapman, A.L.S., who reported a good attendance and a beautiful afternoon. A large variety of objects of interest were met with, particularly of minute life, such as Foraminifera and Ostracoda. These, he remarked, were so interesting that he had prepared some detailed notes concerning the different forms, which he would submit later.

GENERAL BUSINESS.

Mr. A. D. Hardy, F.L.S., drew attention to the confusion and interruption at the Club meetings since the inception of the system of adjourning for ten minutes for the purpose of making an examination of the exhibits. Some time ago it had been decided to give this method of procedure a trial. During the period of its continuance his own feeling, and that of many others, was that the system should be discontinued, or modified, as, in addition to its other disadvantages, the break tended to unduly prolong the evening. He would therefore move that the ten minutes adjournment at present in vogue be discontinued. Mr. P. R. H. St. John seconded the resolution.

Mr. A. L. Scott expressed himself in favour of the system. The sole reason the alteration was made was to allow of persons examining the exhibits, which were always valuable and interesting.

Mr. D. Best said the interval was a great acquisition, and he was strongly in favour of its continuance.

Mr. J. Gabriel moved, as an amendment—"That the system be given a further trial of six months"; and pointed out that the adjournment could be suspended in the event of a lengthy paper, or on lantern nights.

The chairman concurred with Mr. J. Gabriel's remarks, considering the objections against the break were not serious.

Messrs. J. Searle and F. Pitcher also spoke.

Mr. A. L. Scott seconded the amendment, which was put to the meeting, and carried.

REMARKS ON EXHIBITS.

Mr. J. Searle, in calling attention to his exhibit of *Ibla quadrivalvis*, one of the cirripedes or barnacles, collected during

the Williamstown excursion, said that the genus Ibla contained only two species, both of which had been recorded from New South Wales and South Australia, as well as Victoria. The life-history of the barnacles was very interesting from the fact that from the egg is hatched a larval free-swimming form, termed a nauplius, a small triangular body bearing three pairs of limbs, thus showing its crustacean origin. This, on moulting, assumes a cyprid form, afterwards attaching itself by the head to a stone or fixed object and developing into a barnacle. It lives a sedentary life, catching its food with its feet, which are the beautiful plumed cirri seen waving from the shell of the barnacle when living.

Mr. F. Pitcher drew attention to his exhibit of three species of Acacia at present displaying bloom in the Botanic Garden; these were the Narrow-leaved Acacia, *Acacia linearis*, Sims, the Sunshine Wattle, *Acacia discolor*, Willd., and the Itea-leaved Acacia, *Acacia iteaphylla*, F. v. M. Also, portion of a flowering branchlet of the Queensland Fire-wheel Tree, *Stenocarpus sinuatus*, Endl., which would serve to indicate the gorgeous appearance the tree at present presented; and in reply to a query said the Stenocarpus usually did well in cultivation.

PAPERS READ.

1. By Mr. F. Chapman, A.L.S., "Notes on Foraminifera and Ostracoda Found in a Sample of Sand at Williamstown Beach."

The author referred to the special interest attaching to this small collection of microzoa from some Williamstown sand collected during the recent Club excursion, and pointed out the great variety of forms from so small a sample. They had a wide distribution, both geographical and geological. The shells were, generally speaking, rather starved or otherwise diminutive, presumably because of the magnesic-bearing rocks in the vicinity. From the ostracodal shells much useful distributional data could be gathered, and, although the determinations had to be made on the empty valves, yet sufficient characters existed to enable one to recognize the various species, and by means of blackboard sketches the principal forms were demonstrated.

Mr. J. Gabriel said he would like to know whether the large series of Foraminiferæ found during the process of boring for coal at Altona Bay some years ago were still extant in the neighbourhood. Mr. Chapman replied in the affirmative.

2. By Mr. A. D. Hardy, F.L.S., "Note on the Contractile Vacuole of a Protozoon."

The author said that, while examining some material collected during the visit of the Club party to Mount Baw-Baw last year, he came across an organism which, at first unlike an amœba, afterwards exhibited a characteristic amœboid movement. The main point of interest lay in the observation of the

vacuole, which, in behaviour, differed in more than one respect, with regard to the cell, from such previous records as he had read. The organism may have been a young amœba, or a testaceous rhizopod escaped from its test. His remarks were illustrated by blackboard sketches, and coloured drawings were used to illustrate a preliminary description of the structure and classification of the Rhizopoda, during which he referred to the idea held by some that continued division of simple forms by fission was suggestive of immortality; despite which instances of the death of the cell were known.

Mr. J. Searle remarked that from Mr. Hardy's statements it seemed difficult to decide whether the object under notice was an amœba or an amœboid form of some other protozoon. He thought that the vacuole was more probably a food vacuole than a contractile vacuole, as suggested. With regard to the statement that amœba divided into two, and these again subdivided, and so on indefinitely, he had found that protozoa, which multiplied by fission, if isolated in a small vessel, after several divisions became enfeebled, and soon degenerated and died; but by introducing fresh individuals into the vessel conjugation between two individuals took place, the protoplasm of each blending together, and the nuclei fusing into one. Then, after a period of quiescence, subdivision takes place, to be again followed by conjugation. He suggested that it was probably the conjugation of two amœbæ which Mr. Hardy had taken for an instance of cannibalism.

In reply, Mr. Hardy quoted Prof. Leidy's description of the seizing and assimilation of *Amœba verrucosa* by *A. limax*, an undoubted and not lonely case of cannibalism.

NATURAL HISTORY NOTE.

Myna and Moth.—Mr. F. Chapman, A.L.S., contributed a short note regarding the attempt of an Indian Myna to catch a small moth, which he had witnessed recently.

EXHIBITS.

By Mr. F. G. A. Barnard.—Growing specimen of Wire Fern, *Gleichenia dicarpa*, R. Br.

By Mr. F. Chapman, A.L.S.—Slide of microzoa, obtained from a pinch of sand collected at Williamstown, 13/3/15.

By Miss Amy Fuller.—Seeds of the Silver Tree of South Africa, *Leucodendron argenteum*.

By Mr. F. Pitcher.—Flowering specimens of the Narrow-leaved Acacia, *Acacia linearis*, Sims, Sunshine Wattle, *Acacia discolor*, Willd., Itea-leaved Acacia, *Acacia iteaphylla*, F. v. M., and Queensland Fire Tree, *Stenocarpus sinuatus*, Endl.

By Mr. J. Searle.—Specimens of *Ibla quadrivalvis*, one of the cirripedes, or barnacles, collected at Williamstown, 13/3/15, and also a mounted slide of the developing ova.

After the usual conversazione the meeting terminated.

EXCURSION TO WILLIAMSTOWN BEACH.

In the unavoidable absence of the appointed leader, the guidance of the party of about sixteen members and visitors taking part in the excursion to the Williamstown Back Beach on Saturday, 13th March, appeared to devolve upon Mr. J. Searle and myself. The cool weather helped to make the afternoon thoroughly enjoyable. The curved sweep of the foreshore at Williamstown admirably shows, at either end, the extremes of wave-action, in regard to their force and sorting power on the rocks and sand. To the west we have the bare rocks of bluestone, with their accompanying shell-fish faunas, as *Cominella*, *Risella*, and *Patella*; whilst to the east the sand forms a wide stretch, amongst which may be picked out the more delicate forms of shell, chiefly bivalves, as the thinner-shelled species of *Venus* and *Meretrix*. From this sandy surface fairly good foraminiferous and ostracodal material could be gathered by scraping up the tide-streaks. The fates were kinder than usual, as the tide was going out during the afternoon, but it was still scarcely low enough to allow of searching amongst the rock-pools. Amongst other objects of flotsam examined, fish-jaws and vertebral bones afforded texts for interesting discussions, during which the comments of Dr. J. L. Blakie, a visitor, were greatly appreciated. Several specimens of a reef-forming coral (*Plesiastraea*) were noticed. A sample of seaweed examined under the microscope showed numerous kinds of diatoms, as *Grammatophora*, whose brown ribands were very abundant; many attached clusters of a stalked *Gomphonema*; fragments of *Lichmophora* fans; and a few stately *Gyrosigma*. Species of nematode worms were also very common in the water, which denoted the presence of a fair quantity of decaying matter present, probably derived to some extent from the outflow of several innocent-looking village drains. An examination of a pinch of the shore-sand from a tidal streak showed numerous corallines and other calcareous algæ; fragments of polyzoa (*Cabcrea*); fry of molluscs, as *Mytilus*, *Meretrix*, *Liotia*, and *Assiminea*. Also the following:—Foraminifera—*Nubecularia bradyi*, Millett, *Miliolina circularis*, Born., sp., *Miliolina polygona*, D'Orb., sp., *Discorbina dimidiata*, Parker and Jones, *Polystomella crispa*, L., sp., *Polystomella macella*, F. and M., sp.; Ostracoda—*Aglaia* (?). *cf. meridionalis*, G. S. Brady, *Macrocypris maculata*, G. S. B., *Bairdia amygdaloides*, G. S. B., *Cythere demissa*, G. S. B., *Cythere foveolata*, G. S. B., *Loxoconcha alata*, G. S. B., *Xestoleberis depressa*, G. O. Sars.; Cirripede—*Ibla quadrivalvis* (col. J. Searle).—F. CHAPMAN.

NOTE ON A LARGE SPECIMEN OF *CONUS DENNANTI*, TATE.

(With Figure.)

By F. CHAPMAN, A.L.S., Palæontologist, National Museum, Melbourne.

(*Read before the Field Naturalists' Club of Victoria, 8th Feb.*, 1915.)

DURING the transgression of the Miocene sea upon the Australian continent, great thicknesses of sediments, as clays and shell-marls, with occasional greensands, were laid down, particularly along the coast-line of that period. Both on sea

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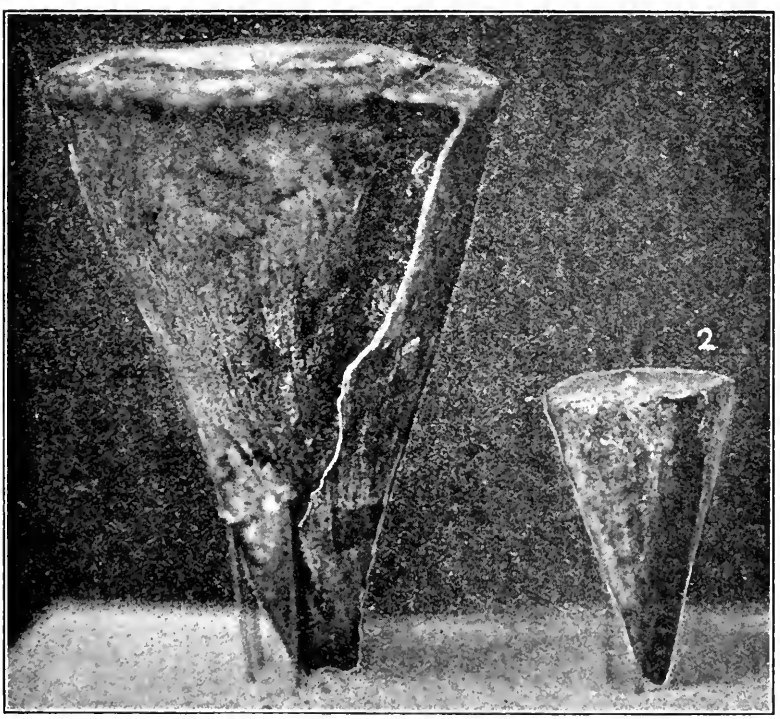

F. C., *photo.*

1. CONUS (LITHOCONUS) DENNANTI, TATE. Megalomorphic Shell. Janjukian. Bird Rock Cliffs, Torquay, Victoria.

2. DITTO, normal type. Balcombian. Muddy Creek, near Hamilton, Victoria.

and land the Miocene fauna and flora were then very abundant and varied in character. It was during these flourishing times that the earlier and often smaller types of shell-fish, as well as

of sea-urchins and other animal forms, reached in many cases their maximum stage of development. Australia shared in this feast of fat things, which was spread at the time over many parts of the world, and her Miocene marine fauna consequently yields an occasional specimen of gigantic proportions compared with similar forms and species from the older and younger rocks of the Tertiary series.

One such greatly developed form, which seems worthy of notice, is the shell of a Conus found by Mr. W. J. Parr in the Bird Rock Cliffs, Torquay, and lately presented by him to the National Museum. It belongs to Tate's species, *Conus dennanti*,* a form which shows certain affinities to *C. pullulescens*, T.-Woods. It differs from that species in the flat or even concave spire, a character which remains pretty constant, as well as in the non-angulate or turbinate protoconch, as pointed out by G. F. Harris,† who, by the way, furnishes a good description of this shell.

The length of the large specimen from the Bird Rock Cliffs is 88 mm., with a width, at the apical end, of 60 mm.

The largest specimen of *C. dennanti* in the Dennant collection at the National Museum is from the Balcombian of Clifton Bank, Muddy Creek, near Hamilton, Victoria, and measures only 52.5 mm., whilst its greatest apical width is 35.5 mm. There is a tendency in this cone for the form of the shell to become irregular or even elliptical in cross section, whilst *C. pullulescens* remains fairly constant in its spiral growth.

"The Austral Avian Record."—Three numbers (vol. ii., Nos. 5, 6, and 7) of this journal are before us. As usual, the principal contents are additions and corrections to the editor's check-list of Australian birds. With the frequent use of the prefix "Alpha" or the termination "ornis," the editor will still be able to provide for a few hundred new genera, while the minor differences requiring recognition as sub-species remind one of the results of a philatelist's perforation gauge. We note that *Mathewsia*, introduced by Mr. T. Iredale for *Antigone*, has been altered to *Mathewsena*, owing to priority of somewhat similar names. In a short article on the genus Fregata, of which only two species are admitted in the "British Museum Catalogue of Birds," vol. xxvi., Mr. Mathews has managed to name one new species and about half a dozen sub-species, besides altering the specific name of *F. aquila* to *F. minor*.

* Tate, R., Trans. R. Soc. S. Austr. (marked vol. xiii. on pl. xi., but apparently issued with vol. xv., 1892), pl. xi., fig. 7 (name, without description).

† Cat. Tertiary Mollusca Brit. Mus., part i. Australasia, 1897, p. 33, pl. ii., figs. 8*a*, *b*.

WANDERINGS ON THE MURRAY FLOOD-PLAIN.

By J. G. O'Donohue.

(*Read before the Field Naturalists' Club of Victoria, 8th Feb.*, 1915.)

Actuated by the belief that many of the birds and animals of the Mallee, that had not as yet adapted themselves to life in an arid region, would be compelled, by reason of the abnormally dry season, to resort to the Murray, or to those lakes on its flood-plain affording a permanent water supply, Mr. A. W. Milligan, Mr. O. Rosenhain, and myself determined to visit Mildura and make inquiries there relative to the conditions prevailing at two places we had selected, in its neighbourhood, as being the most likely, from their situation, to contribute to the assemblage of faunal and avi-faunal types under stress of an unfavourable season in their usual habitat. These were Taupalin, on the New South Wales side of the Murray, and Lake Mournpoul, on the Victorian side.

Accordingly, we left Melbourne by the 4.15 express on Friday evening, 4th September, and, after a long and tiresome journey of 351 miles, reached Mildura the following morning at 7.20.

We were soon apprised that Lake Mournpoul, about 60 miles due south of Mildura, and situate on the flood-plain of the Murray, was deemed the most likely to possess the essentials we sought—viz., a large area of permanent water bordering an extensive tract of arid country, and affording in its vicinity sustenance for bird and animal.

Proceedings were at once instituted to effect an early start for the lake on Monday, 7th September, and these being expeditiously and satisfactorily completed, the remainder of the forenoon was spent visiting the principal places of interest in the town, under the guidance of the ex-president of the shire, Mr. Whitford, and the local stock inspector, Mr. M'Leod. After lunch Mr. Rosenhain elected to accompany the latter on a sixteen-mile drive he purposed making before supper, whilst Mr. Milligan and I wandered off along unknown streets and avenues noting the birds and flowers.

The principal and unquestionably the finest flowering shrub met with in our ramble was *Cassia Sturtii*. It occurred in more or less abundance on many of the thoroughfares we traversed, and was invariably found in the height of perfection. Several of the fruit-growers with whom we conversed respecting it maintained that the Dense Cassia flowers best after a drought, but in only one instance was an attempt made to assign the reason why. The cause is undoubtedly due to the fact that during a dry season, when grass is scarce, stock eat the plant almost to the roots, and when a favourable spring ensues, with

its accompanying abundance of herbage, the plant is untouched, and is consequently afforded an opportunity to promote a growth of twigs, and, at a later stage, to display its floral beauty to the wayfarer.

The Spike Acacia, *A. oxycedrus*, the Furze Acacia, *A. colletioides*, and the Willow Acacia, *A. salicina*, were noted bearing flowers in more or less profusion. *Kochia villosa*, Silky Blue-bush, *Kochia pyramidata*, Shrubby Blue-bush, and *Kochia sedifolia*, Dense Blue-bush, were the most conspicuous of the Chenopodiaceæ, and evidenced a surprising degree of luxuriance, despite the inhospitable situations in which they were invariably found.

Among the many familiar types of birds noted were the Black-backed Magpie, *Gymnorhina tibicen*, and the Singing Honey-eater, *Ptilotis sonora*. The former was frequently observed in large numbers on the cultivated areas, and the latter amid the foliage of the Flame Trees, *Sterculia acerifolia*.

Sunday forenoon was devoted to a ramble along the river beneath the giant red gums, in whose leafy crowns numerous varieties of birds had sheltered. The only flowers seen were those borne by sickly plants of the Smooth Minuria, *Minuria integerrima*, Australian Centaury, *Centaurea australis*, and the Small-leaved Swainsona, *Swainsona microphylla*. Whilst resting in the shade of the gums we were afforded a striking illustration of the courage and insouciance of the average country child. An undersized, short-frocked girl, whose age was probably not more than ten years, pedalled rapidly to the water's edge, near where we were seated, tossed her bike into a row-boat, and, casting loose the painter, seized a pair of heavy oars and pulled out into the current, which, at this point, was running very strong. Slowly but with grim determination she forced the boat to the opposite bank, and, after securing it to a convenient peg, mounted her bike and rode away along a dusty road as if the feat she had just accomplished was one that required neither the possession of nerve or skill.

Immediately after lunch Mr. Whitford and Mr. Partridge, general manager of the Mildura Irrigation Trust, called with a motor-car and drove us to Irymple. We were back in time for tea, and parted from our friends with many good wishes for the success of our trip, and promises of a better time on our return.

In passing, we cannot refrain from adverting to the kindness and consideration shown us by the secretary and assistant secretary of the shire, by Messrs. Whitford and M'Leod, and by Councillor and Mrs. Gordon, all of whom were only too willing to impart any information that might be of service to us on our projected trip.

Monday, 7th September, found us early astir, and in a short time ready and eager to commence the initial stage of our journey; but, despite our best efforts, it was not until 9.45 that our unicorn team was headed due south along a thoroughfare lined on either side by comfortable dwellings, whose investure of vines evidenced, by their tender green appearance, the advent of spring. The road being good, and the horses fresh and willing, we made rapid progress, and soon reached the settlement's southern cultivation limit, in the neighbourhood of a large "billabong." Descending a short, steep slope, we found ourselves on the flood-plain of the Murray, a dreary, sun-parched, mud-coated area dotted with innumerable stumps, and strewn with the litter of a once dense box forest.

With the exception of a few sparse growths of Tangled Lignum, *Muehlenbeckia Cunninghami*, no living bush or plant was to be seen. In this inhospitable area scores of miserable sheep tottered aimlessly about in single file, nibbling at each other's wool, or chewing twigs and dry gum leaves in vain effort to assuage the pangs of hunger and to stave off approaching dissolution. From such a scene as this the eye insensibly turned for relief to the serried ranks of the luxuriant and giant Red Gums, *Eucalyptus rostrata*, that margined the river on our immediate left, or to the long, irregular line of mucronated pine-tops that stood out sharply against the sky line, some miles distant, on our right. As we progressed the lignum bushes increased in number, and among them occurred gnarled specimens of the Eumong Acacia, *Acacia stenophylla*. These, as the stiff clay was succeeded by a more arenaceous formation, were supplanted by the Murray Pine, *Callitris robusta*, and the Ming Quandong, *Fusanus* (*Santalum*) *persicarius*, and by dense thickets of the sea-green Tree Tobacco, *Nicotiana glauca*. Amid the growths of this naturalized alien Crested Pigeons, *Ocyphaps lophotes*, were to be counted in scores, and it would seem that they contribute largely to its spread by consuming and subsequently disseminating its seeds.

At noon we reached a temporarily deserted wood-getters' camp, situated on the Murray. Here we decided to rest and feed the horses and to partake of some refreshment. Whilst lunching we were entertained by Gilbert's Thickhead, *Pachycephala gilberti*, and by the Brown Fly-catcher, *Microeca fascinans*, the latter repeatedly favouring us with its rapid series of pleasing notes from the limb of a low tree close to the camp. The Spotted Bower-bird, *Chlamydodera maculata*, and the Peaceful Dove, *Geopelia tranquilla*, were noted hereabouts, and also a large specimen of the Lace Lizard, *Varanus varius*.

After an hour's rest we resumed our journey, and diverged

somewhat from the river, which had hitherto flowed in close proximity to our course. Ascending a sand-ridge, we found the track margined for the most part with the Needle Hakea, *Hakea leucoptera*, and the Ming Quandong, *Fusanus persicarius*, both of which were in profuse bloom. The Murray Pine soon became common, and at a later stage the Giant Mallee, *Eucalyptus incrassata*, the Slender Mallee, *E. calycogona*, the Blue Mallee, *E. fruticetorum*, and the Hooked Mallee, *E. uncinata*. The Coast Twinleaf, *Zygophyllum Billardieri*, grew luxuriantly among the dwarf eucalypts, and, though the sheep and rabbits were dying of starvation beside large, succulent growths of it, we did not observe any bush evidencing the slightest indication of having been touched by one or the other. By reason, probably, of some bitter principle it contains, the plant seems to be as obnoxious to sheep and rabbits as the Pimpernel, *Anagallis arvensis*, and the Small St. John's Wort, *Hypericum japonicum*.

Descending to the flood-plain once more, we found it in a stage of transition that would ultimately leave it in a condition similar to that portion we first encountered—a barren, treeless waste, dotted with innumerable stumps, and littered with the waste of a former forest. The timber-getters were busy. On either side of the track lay piles of weathered tops and disordered heaps of trunks and limbs—the former awaiting the fire-stick, and the latter removal to the river's bank, there to remain till the winter floods permitted of the steamboats ascending the river and conveying them to the pumping stations in the neighbourhood of Mildura.

The chief, if not the sole, cause of the large quantities of sand finding their way into the Murray and rendering its navigation more difficult each year is undoubtedly due to the reckless destruction of the timber growing on the Victorian flood-plain, thereby affording the storm and flood waters power to increase and to carry their load of suspended material into the river unchecked.

Swinging in towards the Murray again, in the neighbourhood of Caradoc Station, we noticed its high banks, in the vicinity of M'Grath's Island, margined for chains by the old kitchen middens of the aborigines. From now on till nightfall birds became exceptionally numerous and varied. Flocks of Crested and Bronze-wing Pigeons were flushed at every few chains, and scores of Maned Geese, Black Duck, Teal, and various varieties of Cormorants were noted on the river and on the "billabongs." The White Egret, *Herodias timoriensis*, and the White-necked Heron, *Notophoyx pacifica*, were almost as common as the familiar Blue Crane, *Notophoyx novae-hollandiae*.

Ascending what proved to be the last sand-dune on this stage of the journey, we found it thickly overgrown with the introduced Stinkwort, *Inula graveolens*, and Crownbeard, *Verbesina encelioides*. Here the second pair of Emu noted on the trip were descried on the side of a hill, leisurely plucking the Tall Thickheads, *Myriocephalus Stuartii*. At dusk the roof of the Kulkyne Station homestead was detected above the tops of the Old Man Saltbush, *Atriplex nummularia*, that here, strangely enough, forms large growths, and occupies, with other salsolaceous plants, a somewhat restricted area. Having presented our letter of introduction to the manager of the station, Mr. Thompson, and reluctantly declined his invitation to spend the night at the homestead, we drove off, and proceeded some distance up the Murray.

As the supply of daylight showed unmistakable signs of giving out, we decided to construct our camp near the river, and close to a pile of firewood estimated to contain over 500 tons. The timber-getter, who was camped in the vicinity of this bulky and weighty evidence of his months of strenuous labour, accorded us the usual hearty bush welcome, and at once placed his fire and cooking utensils at our disposal. When all had been made snug for the night, we gathered around the wood-getter's camp fire, and were regaled with many interesting incidents of the once large, but now extinct, tribe of tall, muscular blacks that ranged the countryside some sixty years ago. To the north, we were informed, was a large sand-dune wherein, it was computed, thousands of blacks had been interred, most of whom, it was believed, had died of small-pox. Speaking in reference to the matter subsequently, Mr. Thompson, the manager of Kulkyne Station, said that when a lad he had been informed by a very aged blackfellow, who was frightfully scarred with pockmarks, that all his tribe—a very numerous one—were buried in the sand-dune. The old man graphically related to him how a strange black came to the camp one day with the disconcerting information that the "devil-devil" was coming down the river and was killing all the blacks on either bank; how a dozen members of the tribe sickened that evening, and on the following day died; how he contracted the disease, and on his recovery found that all, or nearly all, his tribe had perished; how he fled into the remote recesses of the Mallee, where he remained for two years, and how, on returning to the site of the old camp, he discovered the bleached remains of his former comrades scattered about in the positions they had been overtaken by death; how he remained there alone for many months till joined by other blacks, and how a fresh tribe was gradually built up, to be in turn exterminated, but

less suddenly, by the vices and diseases of civilization. The old native's account supports the generally accepted belief that the disease came down the Murray, or from the direction of Sydney, where it was introduced in January, 1788, at Botany Bay, by the first convict fleet, and subsequently spread practically throughout the whole of the continent, destroying, it is computed, at least a third of the Australian aborigines. Incidentally, we were also informed by the wood-getter that a sand-hill to the south of our camp had been a burial-ground of the Kulkyne tribe, and contained hundreds of perfect skeletons, many of which had been exposed during recent years by wind erosion.

Conversation was continued far into the night, and before retiring to our not too comfortable resting-place Mr. Rosenhain and I determined to pay the necropolis an early visit on the morrow. I was astir before 5 a.m., and wandered some distance into the still dark vistas of the bush to hearken to the calls of the birds, which were then beginning to herald the advent of dawn with more or less vehemence. The most persistent calls were those originating from the Curlew, the Boobook, the Spotted Bower-bird, the Laughing Jackass, the Brown Flycatcher, the Black-and-White Fantail, and the White-plumed Honey-eater. The White-fronted Heron, the Black Duck, and the Spur-winged Plover frequently contributed to the medley.

Breakfast was well on the way towards completion before the sun had risen, and, after rendering Mr. Milligan some little assistance in packing the camp impedimenta, Mr. Rosenhain and I set out with our cameras for the sand-dune. Striking due south at a rapid rate, through rank growths of Tangled Lignum, thickets of the Eumong Acacia, and the Black Box, *Eucalyptus bicolor*, all of which were inundated when the river overflowed its banks, we soon discerned a long, irregular hill, trending east and west, and rising somewhat abruptly from the level ground. So far as our investigations extended, we found this to be thickly invested with the Tall Thickhead, *Myriocephalus Stuartii*, and the Small-leaved Swainsona, *Sacainsona microphylla*. The introduced yellow-flowered composite, *Verbesina encelioides*, or Crownbeard, was also abundant, and is reputed locally to have occasioned the death of many head of stock which had browsed upon it. This, however, is an erroneous opinion, since Professor Ewart, to whom the plant, with others, was submitted for identification, points out that no species of the genus to which the Crownbeard belongs is known to be poisonous, and any injurious action it may have is a mechanical one.

Proceeding to those parts of the dune where the north wind

had scoured out deep and extensive holes, we searched vainly for the numerous skeletons alleged to be had for the trouble of picking up; but, beyond small particles of bone, derived for the most part from the disintegration of the parietal and those of the tibia and femur, we saw nothing worthy of the exposure of a plate. Trending west along the dune, the loose sand, evenly and regularly rippled by the wind, and fretted with the tracks of the emu, the fox, the rabbit, the pigeon, the opossum, and other creatures, proved heavy going. Leaving Mr. Rosenhain the task of securing a snapshot at a pair of nimble-footed emu, I pushed on along the crest of the dune for fully a mile, searching, but without success, for the objects of our quest. Hereabouts the Native Tobacco, *Nicotiana suaveolens*, and the introduced Sea-green Tobacco, *Nicotiana glauca*, grew extensively, and the Ice Plant, *Mesembryanthemum crystallinum*, was plentiful and exceptionally luxuriant.

I was about to retrace my steps when I noticed a large Wedge-tailed Eagle, *Uroaëtus audax*, quit a stunted pine on my left and come directly towards me. I at once crouched down beside a bush of *Leptospermum flavescens* and awaited developments. The bird passed over my head so close that I could have struck it with the barrel of my rifle, and, wheeling immediately, circled the bush a few feet above me with downstretched neck and inquiring eyes. Extracting my camera from its case, I strove to get it in working order, but, between undue haste and fine sand, my progress was so slow that when I was in a position to make an exposure the eagle, with its curiosity somewhat satisfied, was circling some fifteen yards from me at no great height, but with sufficient speed to nullify all my efforts to get its image on the finder.

Rejoining my companion, we struck north-east across the flood-plain in the direction of our camp. The ground over which we passed was parched and fissured by the protracted drought, and only a few sparse growths of Bamboo Grass, *Glyceria ramigera*, Woolly-fruited Saltbush, *Bassia sclerolænoides*, Spear-fruited Saltbush, *Bassia quinquecuspis*, Wingless Blue-bush, *Kochia brachyptera*, and the Smooth Minuria, *Minuria integerrima*, were to be seen. The Black Box, *Eucalyptus bicolor*, and the Umbrella Acacia, *Acacia Osswaldi*, abounded, and from every tree of the latter one or more shelter-bags constructed by the larvæ of the Processionary Moth, *Teara contraria*, was suspended. In no instance, however, was the larvæ found within them, nor did any shelter-bag approach in size or perfection that exhibited by the president, Mr. J. A. Kershaw, at the Club meeting on 6th August last. The bags noted were invariably hung on the south side of the trees, possibly to shelter them from the north wind, which, we were

informed, was the prevailing one, but it would seem that most of the strong winds blow from the west, since we subsequently noted, in the neighbourhood of Mournpoul, that all, or nearly all, the pines prostrated by the wind had fallen with their tops to the east. On reaching our temporary camp, at 8.30, we found that arrangements had been made by the manager of the Kulkyne Station for us to spend the day at the homestead, and proceed on the morrow to Mournpoul.

Learning of our lack of success on the sand-dune, Mr. Thompson proposed a second visit after lunch. On this occasion, under his guidance, we had no difficulty in finding the principal burial-ground, which was situated on the eastern slope of the dune, in close proximity to the river, so that the body of the deceased might be more easily conveyed to its last resting-place in the frail bark canoe that must have been extensively used by the Kulkyne tribe, since scores of trees were noticed from which the bark had been stripped for their construction. In nearly every instance the decorticated tree had a more or less pronounced bulge in its trunk at the spot from which the bark had been removed. The necropolis was evidently of considerable antiquity, for many robust trees of the Eumong Acacia flourished on and among the graves, and the logs that had been placed upon the then newly-made mound to protect the body from the depredations of the dingo were rendered by the weather as light as cork. Sinking down several feet into the loose sand, the remains of a sheet of red gum bark was encountered, and beneath it, in a reclining position, rested the skeleton, the feet being towards the east. From the slender nature of the bones, which were in an excellent state of preservation, and the fact that the jaws did not contain the full complement of teeth, it was assumed that the remains were those of an immature female. The mode of burial was consistent with the blacks' custom of the disposal of deceased females. In disposing of the corpse of a male the knees were fastened to the neck, the arms to the body, and the legs were firmly secured. The wrists were bound to the ankles, the thumbs were tied tightly together, and the nails burnt, all these precautions having for their object the prevention of the deceased's ghost from reaching the surface after interment, and injuring or frightening his former friends and relatives. Such elaborate precautions were not taken with the corpse of a female, since women were as little feared by men during life as their spirits were after death. As a general rule, the body was placed between two sheets of bark and laid in the grave at full length.

The remainder of the day was spent in the vicinity of the Kulkyne homestead collecting botanical specimens and noting

the abundance and variety of bird-life. In the horse paddock the Old Man Saltbush, *Atriplex nummularia*, formed dense masses of great extent, and often exceeded a height of ten feet, whilst elsewhere it and the Grey Saltbush, *Atriplex cinerea*, were eaten by stock close to the ground. Among these growths *Eremophila maculata* was often found in profuse bloom, and with the previous season's fruits scattered thickly at its base. The Nardoo, *Marsilea quadrifolia*, and the Spoon Mudwort, *Limosella Curdiana*, grew luxuriantly on the moist bottoms of the billabongs.

At dusk, whilst taking a well-earned rest on the station verandah, and viewing the parrots, pigeons, doves, bower-birds, &c., as they came to roost in the pepper-trees, Johnny, a full-blooded aborigine, arrived with a young "roo" (kangaroo)—the folk at Kulkyne have no time for the first two syllables. The event proved a very fortunate one, since it led up to a statement by Messrs. Thompson and Briggs totally at variance with the accepted belief that the doe kangaroo voluntarily abandons her young one to ensure its safety when she is in danger of being overtaken by her pursuers. The general opinion entertained by naturalists, and certainly expressed by all writers of natural history, is that the doe, when hard pressed by the dogs, draws the young one from her pouch and tosses it into a convenient bush for safety, and returns for her offspring if she succeeds in evading her pursuers. In common with many others, I accepted this as the true interpretation of what might be deemed an unparalleled maternal trait, but was always sceptical that the slender forearms of the doe possessed the strength, or the paws the grasping power, to draw a vigorous and weighty "joey" from her pouch and to cast it to a distance whilst she was careering over rough country, possibly at the rate of forty miles an hour.

Our bushmen, who had spent their lives amid the animals of the wilds, and who were as keen in observing the ways of Nature as the greatest enthusiast of the Club, were surprised at the view generally entertained on the subject. Briefly, their opinion, based on hundreds of cases that had come under their notice, was that the young one, by its weight, gradually and greatly enlarged the pouch, as the mother, by her enormous leaps, imparted to it a more or less vertical motion, and at the same time injured it by the action of her hips. This continued till the young one, coming fairly in contact with the mother's hip, was sent spinning from the pouch, high in the air, to fall bruised and breathless on the ground. "I have picked up scores of 'joeys' dropped thus," said Mr. Briggs. "All were injured across the loins, and all I carried home died

within twenty-four hours. I will undertake to kill and skin the young 'roo' which Johnny has just brought in to demonstrate the correctness of my statement." When we declined to agree to the poor creature being sacrificed, even in the interests of science, our friend offered to bet us that the young "roo" would be found dead in the morning, despite the care the children would lavish upon it. The following morning, whilst viewing the colour scheme of early dawn, one of the children approached us, and in an awed way intimated that the young "roo" had died during the night. Here, then, is the bald fact, that the young kangaroo's vacation of the pouch during the mother's wild career from her pursuers is not brought about by an act of maternal solicitude, as is alleged, but by an accident which is beyond the mother's power to avert or control.

Among the many highly interesting facts respecting the habits of birds and animals that were elicited during our but too brief association with Messrs. Thompson and Briggs was the mode of procedure adopted by the Duck-Hawk in attacking and killing its prey. In a few brief sentences the two divergent views held by ornithologists were placed before our hosts. Though both were in accord that the hawk attacked from above, it was maintained, firstly, that the death-stroke was administered with the wing, and secondly, that it was with the talons the fleeting victim was killed.

One of the few pastimes indulged in by the Kulkyne naturalists during their leisure hours was "hawking." When the dams were full, and they desired to vary the monotony of salt meat by a fat duck, it was their custom to proceed on horseback to a water-hole, in the vicinity of which a Duck-Hawk was invariably to be found, and induce the ducks to take flight. "This was always a tough proposition, let me assure you," said Mr. Briggs, in a reminiscent tone, "more particularly if the hawk was cruising around. However, when the ducks decided to quit, they simply cut streaks in the air for the nearest part of the river. No sooner had they attained some little distance from the dam than the hawk was to be observed approaching at express speed, and close to the ground. The instant it attained a position immediately beneath its quarry it rose up like a flash, and, striking the fleeting duck at the base of the tail with its breast, sent it somersaulting to earth. When near at hand the impact sounds like a pistol shot, and may be heard three hundred yards off. We have robbed the hawk of its prey hundreds of times, and often, when galloping beneath the pursuer and the pursued, have been almost struck by the falling duck; but we have never picked up a bird minus its head or mutilated in any way,

and have invariably found, on cleaning a duck freshly killed, that the abdomen was extensively bruised. The hawk, I am assured," said Mr. Briggs, in conclusion, "kills for the greater part in a spirit of mere wantonness, for I have often seen it pursue and kill a duck and then fly off in quest of other game."

Early Wednesday morning we bade a temporary adieu to Kulkyne, and, with Johnny in the dual capacity of driver and guide, started for Mournpoul, distant about eleven miles due south. The wind blew strongly from the north-west, and there were indications that the long-expected break in the weather was not very remote. Our route for the first few miles lay through a large area of flood-plain country that at one time nourished a dense forest of sturdy Black Box, and, from indications elsewhere noted, presumably a fair sward of native grass. Twenty years previous to our visit these trees had been ringed, and the resulting consequences were acres of bare, wind-swept earth, destitute of aught green, and a bewildering interlacement of fallen trunks and limbs that would appal even an old-time South Gippsland pioneer.

On reaching Chalka Creek we found its bed dry, narrow, of no great depth, and lined on either side by large and vigorous specimens of *Eucalyptus rostrata*. As we progressed along the creek beneath these trees we were incessantly assailed by the plaintive calls of the Minahs concealed amid their foliage, and by the harsh cries of the numerous Sulphur-crested Cockatoos nesting in the hollow spouts. Here, as elsewhere, we noted the tree-trunks were deeply mud-stained to the height of eight feet as the result of repeated overflows of the Murray. The introduced Stinkwort and the Sea-green Tobacco occur along the creek to a surprising extent.

The aspect of the country underwent a complete transformation when the stiff clay flats were succeeded by the sand-dunes. The creek's bed at once became wider and deeper, and at every bend contained reaches of still water, whereon aquatic birds of many varieties disported. The Murray Pine and the Buloak, *Casuarina Luehmanni*, grew tall and dense on the dunes, and between them the Tall Thickheads, *Myriocephalus Stuartii*, the Small-leaved Swainsona, *Swainsona microphylla*, the Musk Sunray, *Helipterum moschatum*, the Blue Didiscus, *Didiscus cyanopetalus*, the Prickly Starwort, *Stellaria pungens*, the Flannel Cudweed, *Gnaphalodes uliginosa*, and other plants. Extensive growths of the Narrow-leaved Guinea-Flower, *Hibbertia angustifolia*, were noted, and occasional sturdy specimens of the Bignonia Emu-bush, *Eremophila bignoniflora*. In the vicinity of a bridge spanning Chalka Creek the remains of a Murray Cod, *Oligorus macquariensis*, was pointed out, where it hung suspended by a

piece of fencing wire from the limb of a tree. The fish, when killed seven years previously, was estimated to weigh 1 cwt.

The passage of the sand-dunes proved hard and tiresome travelling, and we were pleased when we again found ourselves on the flood-plain, with its more uniform grade and firmer though barer ground. Here, as the going proved good, the horses were livened up, and living vistas of Grey and Black Box trees, with the Buloak interspersed, opened out on either side in quick and varied succession. Our rapid progress was at length stayed by a long, low, limestone ridge that ushered in a new type of vegetation. Upon this elevation we observed for the first time the Leafless Ballart, *Exocarpos aphylla*, the Broad-fruited Myoporum, *Myoporum platycarpum*, the Needle Grevillea, *Grevillea triternata*, the Southern Cassia, *Cassia australis*, the Giant Hopbush, *Dodonea viscosa*, var. *spathulata*, and the Berrigan, *Heterodendron oleæfolium*, with the Purple Pentratrope, *Pentratropis quinquepartita*, sprawling over it. The Umbrella Acacia, *Acacia Osswaldi*, and the Needle Hakea, *Hakea leucoptera*, grew profusely on the eminence, to which we subsequently applied the name "Aster Ridge," on finding, when endeavouring to obtain a snapshot at a Black-faced Kangaroo, that its western extremity was thickly overgrown with *Olearia* (*Aster*) *pimelioides*.

Descending the southern slope of "Aster Ridge," we emerged on to the dry bed of Lake Yelwell, and had not proceeded far when Johnny pointed out the playing-ground of the Spotted Bower-Bird. The bower was so constructed that its longer axis trended north and south, and was protected from wandering stock by the drooping limbs of a Black Box tree. At the northern exit the birds had placed a number of pieces of blue and white glass, a 12-gauge cartridge shell, numerous limestone pebbles, the bleached excreta of a dingo, a large assortment of mussel shells, and the ribs and vertebræ of sheep and rabbits. Two other bowers were subsequently found similarly furnished. One was noted, in the vicinity of Kulkyne Station, surrounded by nearly a bushel of broken china of infinite variety. Proceeding onward, between alternating belts of Black Box and Red Gum timber, we at length found ourselves amid towering growths of Tangled Lignum, most of which was invested by large, nebulous webs constructed by a spider belonging to the genus Araneus. The bickering of the Spur-winged Plover, the hoarse calls of the Herons, and the not unmusical note of the Black Swans, that came floating to our ears, proclaimed that our destination was near at hand, and on ascending a slight sandy eminence the broad expanse of Lake Mournpoul, with its wealth of bird-life, lay before us.

As we rattled merrily along the northern shore, creating, as

we progressed, great consternation among the feathered tribes sunning themselves thereon, and scaring an emu and her four young ones into more than usual activity, we noted numerous large, circular holes, about eighteen inches in diameter, at varying distances from the water's edge. These at first proved a puzzle to us; but, on being informed that the lake contained Catfish, *Gleichthys australis*, it was assumed that these excavations were the sites of their nests, since the Salmon Catfish makes a basin-like excavation, about twenty inches in diameter, at the bottom of which the eggs are laid and covered with a layer of pebbles. The site for the camp was soon chosen, the tent erected, and lunch prepared, after which we wished Johnny a pleasant return journey, and started on a voyage of discovery around the lake.

Lake Mournpoul is one of a series of comparatively shallow lake basins, some of which are of considerable area, situated in that portion of the Murray flood-plain between Hattah railway station and Chalka Creek. This creek issues from the river near the north-east corner of the parish of Gayfield, and runs, in a more or less westerly direction, through Gayfield, Cantala, and Brockie. About the north-western boundary of the last-mentioned parish it turns north through Cantala, Yelwell, and Kulkyne, and discharges into the Murray at the south-east corner of Colignan. Before the Murray had entrenched itself to its present depth, Chalka Creek was undoubtedly instrumental in diverting an enormous body of water from it to the remotest limits of the flood-plain. Now, however, it is a factor of little importance save in flood time, as it has cut its channel almost, if not quite, to the river's lowest level, and tends to drain the lake basins, previously referred to, almost as quickly as it fills them. Some of these lake basins, as Mournpoul and Hattah, being situated in depressions of greater depth than the majority, retain water permanently, whereas Lakes Konardin, Yelwell, Yerang, Lockie, Brockie, and Little Hattah seldom withstand the evaporation induced by a moderately severe summer, and had been dry for many months prior to our visit.

In making our first inspection of Mournpoul, we noted that, though its area had been reduced to a considerable extent by the abnormal spell of dry weather then prevailing, there were still between 500 and 600 acres covered with water, which in some parts of the lake was estimated to have a depth of twelve feet. The lake is practically encircled by sand-dunes of varying elevations, and overflows to the north-east and south-east. Its shores are flat, and sandy in the vicinity of the dense growth of Red Gum and box timber growing on and at the base of the sand-dunes, but are extremely muddy near the water's

edge. The introduced tobacco flourishes in places, and, from the appearance of many upright, decayed stems of the plant far out in the water, seems to have had a more extensive range on the lake bed than at present. The only other plant noted on the shores was the Small Knotweed, *Polygonum plebejum*. This forms, in favourable situations, a dense sward, which is kept closely cropped by the cattle, sheep, and emus.

When returning to our camp a large Lace Lizard was seen to quit the shelter of the timber on the northern shore and to proceed in a somewhat furtive manner towards the water. Before it reached its objective, however, it was espied by several Grallinas and Minahs, which at once attacked it. Swelling itself up to nearly twice its normal dimensions, and menacing its assailants with its snout, the lizard persisted, for a little time, to pursue its course, but was eventually obliged to turn tail and skurry towards the timber, where in a few moments it was a dozen feet above the ground on the side of a large Red Gum tree. Our hurried approach with a camera induced a further increase of elevation, and finally a leisurely retirement into a hollow spout. Early the following morning the loud cries and the erratic flight of a Mallee Parrakeet, *Barnardius barnardi*, which had a nest in a hole situated in the lowest fork of the gum ascended by the lizard, led us to infer that our friend had discovered the whereabouts of the nest and was regaling itself on the contents.

(*To be continued.*)

Blackfish.—Anglers should note that it is now illegal to capture Blackfish under 8½ inches in length. The minimum length for Murray Cod has been fixed at 15 inches.

Myna and Moth.—I was much amused the other day in watching the efforts of an Indian Myna to catch a crambite moth on the wing. It proved how effective was the short, jerky flight of the moth in enabling the insect to baffle the pursuit of a powerful and mobile bird like the Myna. The direct and resilient or bouncing-rubber-ball type of progression was, however, unequal to the short, W-like movements of its intended prey, and after several futile attempts the bird dropped the pursuit. This group of moths, the Crambinæ, is doubly protected, for these insects closely resemble the glumes of grasses when at rest on the green or brown tufts. The mimicry of insects in particular is so marked a feature as to suggest that few other animal groups have to face so many mobile and far-sighted enemies, thus accounting for this dominant character being developed to so remarkable a degree.—F. Chapman.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday, 10th May, 1915.

The president, Mr. J. A. Kershaw, F.E.S., occupied the chair, and about 35 visitors and members were present.

REPORTS.

A report of the excursion from Upwey to Narre Warren on Monday, 26th April, was made by Mr. F. G. A. Barnard, who intimated that a party of twenty-two members and friends had taken part in the outing. The Rocking Stone, near North Narre Warren, which was figured and described in the January *Naturalist*, was visited, and most of the party tested the ease with which a more or less vertical motion could be imparted to the poised mass of granite, which is computed to weigh about 8 tons. Narre Warren was reached about 5 o'clock, and the 5.30 train taken to the city.

A report of the Sydenham–Bulla excursion, on Saturday, 8th May, was made by the leader, Mr. A. L. Scott, who stated that twenty-five members and friends proceeded to Sydenham by motor. The whole of the party inspected the basaltic columns, and whilst the majority returned to the car and went round in it to an appointed rendezvous at Bulla, eight, including a lady, ascended to the basalt plain above the columns, and, inspecting several natural features on the way, walked across to Bulla, where the motor party was met, and all joined in afternoon tea.

ELECTION OF MEMBERS.

On a ballot being taken, Miss W. F. Eggleston, "Brownmore," Balaclava-road, East St. Kilda, and Mr. C. A. Nethercote, Callantina-road, Hawthorn, were duly elected as ordinary members of the Club.

GENERAL BUSINESS.

Messrs. J. Stickland and J. Wilcox were elected to audit the accounts of the Club for the year 1914–15, and nominations for office-bearers for the year 1915–16 were made.

REMARKS ON EXHIBITS.

In a note referring to his exhibit of a fruiting specimen of the Slender Mistletoe, *Loranthus linophyllus*, Fenzl., collected in the cemetery, North Creswick, Mr. T. S. Hart, M.A., stated that eight out of fifteen blackwood trees were noticed to be

affected, but the mistletoe was not noticed on any other plant, nor on the smaller second-growth blackwoods. The other native trees present in the cemetery are second-growth *Acacia dealbata* and second-growth *Eucalyptus rubida*, but neither of these is large. The situation is the edge of a basaltic plateau extending to the north and west, on which the blackwood occurs sparingly, but he had not noticed the mistletoe elsewhere as yet. The elevation is about 1,430 feet.

Mr. F. Pitcher drew attention to his exhibit of blooms of *Acacia Maideni*, F. v. M., Maiden's Acacia, and *Acacia salicina*, Lindley, var. *varians*, Weeping Cooba, or Willow Wattle, at present flowering in the Botanic Garden, and to a fruiting branchlet of the Queensland Beech, *Gmelina Leichhardtii*, F. v. M.

Mr. J. Gabriel read a note explaining his expibit of a photograph of the nest of a White-backed Magpie, *Gymnorhina leuconota*, constructed on a table in a room in daily use.

PAPER READ.

By Mr. A. D. Hardy, F.L.S., entitled "Notes on Victorian Forests."

By the aid of a series of lantern slides the author described the different types of forests comprised in the forest reserves of Victoria, dealing with those of the humid south as well as the arid north-west. He dwelt upon the destruction wrought by the early settlers in the timbered areas by the universal system of "ring-barking," which was then fostered by the Government, and on the influence this reckless and senseless destruction had upon rainfall and upon the flow of streams. There seemed, he said, to be a lamentable lack of forethought among the pioneers of new countries; all timber was doomed to destruction irrespective of the requirements for shelter and for fuel. In the Mallee the same system was being pursued, and it remained to be seen whether the scanty sward attendant on cultivation would resist wind erosion as well as the natural vegetation.

Professor A. J. Ewart, D.Sc., in complimenting the author on the admirable series of slides shown, suggested that a similar series be obtained and stored in the archives of the Club, so that our successors would recognize that we once had trees. The average countryman regarded trees as enemies, and if the present policy was continued the time was not far distant when Victoria would have practically none. He pointed out that the real action of forests is in acting like a sponge, thus retaining the moisture for a time, and allowing it to get away gradually, and, whilst they have no direct effect on rainfall, their influence indirectly on a country is incalculable, and this is now beginning to be recognized all the world over.

Mr. J. Gabriel said that many years ago the settlers in the Otway Forest felled and destroyed the blackwoods without stint or scruple. After a period of twenty-five or thirty years those portions that had been used in fencing and in the construction of buildings were now being eagerly sought after, and sent to England to be worked into veneers.

In reply to a query by Mr. Barnard relative to the size attained by the pines in the Mallee, Mr. Hardy said the average diameter was about nine inches, and in reply to Mr. Pitcher's question, "Is there any particular area in Victoria where blackwoods exist in large quantities?" he was compelled to answer in the negative.

NATURAL HISTORY NOTES.

Natural history notes were contributed by Miss Amy Fuller, describing a fight between two Great Brown Kingfishers for a snake; and by Mr. G. A. Keartland, regarding the breeding in captivity of the Warbling Grass-Parrakeet.

EXHIBITS.

By Mr. F. G. A. Barnard.—Specimen of Common Mistletoe, *Loranthus celastroides*, Sieber, with thickened leaves, collected at Greenvale, 9/5/15; also a specimen of basalt from the "Organ Pipes," Sydenham.

By Mr. T. S. Hart.—Specimen of Slender Mistletoe, *Loranthus linophyllus*, Fenzl., in fruit, and parasitic on *Acacia melanoxylon*, from cemetery, North Creswick.

By Mr. J. Gabriel.—Photograph of nest of the White-backed Magpie, *Gymnorhina leuconota*, constructed on a table in a dwelling.

By Mr. F. Pitcher.—Blooms of *Acacia Maideni*, F. v. M., Maiden's Acacia, and *Acacia salicina*, Lindley, var. *varians*, Weeping Cooba, or Willow Wattle, at present flowering in the Botanic Garden; and also a fruiting branchlet of the Queensland Beech, *Gmelina Leichhardtii*.

By Mr. J. G. O'Donoghue.—Spiny Emex, *Emex australis*, Steinh. (N.O. Polygonaceæ), collected at the "Organ Pipes," 8/5/15.

After the usual conversazione the meeting terminated.

EXCURSION TO NARRE WARREN.

The holiday on Eight Hours Day, Monday, 26th April, was utilized for another visit to the Logan or Rocking Stone, near North Narre Warren, as the ladies of the party had not been able to reach it in November, when the previous attempt was made. This time it was decided to make Upwey the starting place instead of Belgrave, as being slightly nearer. After the

usual delays which seem to be inseparable from holiday trains. Upwey was duly reached, when it was found that members and friends had mustered in good force (ladies formed about half the party), and, as the day was everything that could be wished, a pleasant ten-mile walk was anticipated. Striking out in a south-easterly direction, the Ferny Creek was soon crossed, then a somewhat steep ridge had to be climbed before we could look down on the broad, cultivated valley of the Monbulk Creek. On the banks of the creek a halt was made for lunch; then, continuing our walk over some granite hills, the Lysterfield road was reached and traversed for a short distance before paddocks were again entered. Flowers were scarce, but several specimens of the sweetly-scented orchid, *Eriochilus autumnalis*, were met with. A solitary plant of the composite *Cassinia spectabilis* was seen, which, though not in flower, was noted as a novelty. We had now reached the rather steep hill on the side of which the Rocking Stone is situated, and were soon alongside that unique feature, of which the dimensions and a photograph were given in the January *Naturalist*. Most of the party had the satisfaction of making it move, and an hour sped quickly by as members sat and rested, wondering how long had elapsed since the stones were weathered into their present shapes, or admiring the charming view of the surrounding country. As there was a five-mile walk ahead we could not stay too long, so the road to Narre Warren station was taken, and the half-past five train duly boarded. Mr. P. R. H. St. John tells me that nine species of eucalypts were seen during the day—viz., the Manna Gum, Narrow-leaved Peppermint, Silver-leaved Stringybark, Red Stringybark, Mountain Gum, Swamp Gum, Long-leaved Box, and Yellow Box, while of birds at least twenty-five species were noted, among them being the Brush Bronze-winged Pigeon, Nankeen Kestrel, Boobook Owl, Scarlet-breasted Robin, Flame-breasted Robin, Yellow-breasted Shrike-Robin, Blue Wren-Warbler, and Grey Shrike-Thrush.—F. G. A. Barnard.

EXCURSION TO SYDENHAM.

For the visit to the so-called "Organ Pipes," on Jackson's Creek, near Sydenham, on Saturday, 8th May, a char-a-banc capable of holding twenty-eight was engaged, and nearly every seat was bespoken. After a pleasant ride of some fifteen miles along the Mount Alexander-road, passing through Essendon and Keilor, the nearest point to the "Organ Pipes" was reached just before 3 p.m. Here the whole party alighted, and walked down to the creek, where the basalt columns proved of great interest to those seeing them for the first time. As well-

illustrated reports of previous Club visits have appeared in the *Naturalist* for November, 1900 (vol. xvii., p. 120), and July, 1911 (vol. xxviii., p. 51), further description now is unnecessary. Having spent an hour in examining the columns and their surroundings and speculating on the cause of such a unique feature, the majority of the party returned to the car, and motored round to the Sunbury road, and along it to Bulla. In the meantime half a dozen of the more active members had walked across the basaltic plateau to the entrenched meander on the Deep Creek, or Saltwater River, figured in Professor Gregory's "Geography of Victoria," thence across the granite outcrop opposite "Glenara," to the Bulla school, near which an occurrence of kaolinized granite has been worked for commercial purposes. Joining the motor party in the village, afternoon tea was partaken of, then the journey was resumed to town, which was reached about 7 p.m. The outing proved thoroughly enjoyable, and was voted an improvement on the former way of reaching the "Organ Pipes"—by a three-mile walk across the plains from Sydenham station. The only plants found in bloom interesting to the botanists were the Austral Tobacco, *Nicotiana suaveolens*, Leh., and the Creeping Monkey-flower, *Mimulus repens*, R. Br. An introduced plant, *Cucumis myriocarpus*, Naud., an African native, known as the Gooseberry Cucumber, was conspicuous in many places on account of its globular fruits.—A. L. Scott.

A Kookaburra Note.—Whilst in the Blackwood district, in the southern portion of Western Australia, I have frequently watched the Kingfishers and little Blue Wrens, &c., with great pleasure, and have seen the Kookaburra (Laughing Jackass) fly up into a tree with a small snake in its bill; but whilst in the Marysville district early this year I was greatly interested in watching a fight for food between two Laughing Jackasses, and I have been asked to relate the little story to you to-night. A fine big Jackass flew up into a large dead gum-tree, perching on a bough some distance from the ground. In its bill it held a snake—I should say about a couple of feet long—one end of which hung longer than the other. Barely had it settled when up came another "Jacky" and grabbed the longer end of the dangling snake. In vain the owner tried to shake the intruding bird off, but the newcomer hung on tight and whirled itself round and round in a circle, still suspended in the air, until the poor bird on the branch was forced either to let go of the snake or else it broke in two—I don't know which; at any rate, off flew the greedy victor with the prize, leaving the poor owner disconsolate.—Amy V. Fuller. 10/5/15.

WANDERINGS ON THE MURRAY FLOOD-PLAIN.

By J. G. O'Donoghue.

(*Read before the Field Naturalists' Club of Victoria, 8th Feb.*, 1915.)

(*Continued from page* 20.)

At any hour of the day Mournpoul and its immediate vicinity presented a varied and animated picture of bird-life. Close in shore, wherever the eye elected to dwell, phalanxes of Black Swan, Teal, Black Duck, and Hoary-headed Grebes, *Podicipes poliocephalus*, were to be discerned floating lazily on the placid water or feeding leisurely on the molluscs that abounded in immense numbers amid the dense, irregular selvedge of Vallisneria, *Vallisneria spiralis*, Curly Pond Weed, *Potamogeton crispus*, and *Chara*, sp.

Further out companies of Pelicans, *Pelecanus conspicillatus*, sailed aimlessly about, and seemed like miniature yachts under a full spread of snow-white canvas, whilst overhead Pacific Gulls, *Gabianus pacificus*, and Caspian Terns, *Hydroprogne caspia*, wheeled in erratic evolutions, and a pair of Ospreys, *Pandion leucocephalus*, regarded with anxious eye by the smaller water-fowl beneath, circled on apparently motionless wings. It was on the flat shores of the lake, close beside its muddy margin, that the abundance and variety of bird-life was most strikingly manifest. At many points large companies of Cormorants, comprising the Black, *Phalacrocorax carbo*, the White-breasted, *P. gouldi*, the Pied, *P. hypoleucus*, and the Little Black, *P. sulcirostris*, were to be seen sunning themselves. Flocks of Sharp-tailed Stints, *Heteropygia acuminata*, Red-capped Dottrels, *Ægialitis ruficapilla*, and White-headed Stilts, *Himantopus leucocephalus*, foraged in company with numerous White Egrets, *Herodias timoriensis*, Pacific Herons, *Notophoyx pacifica*, and White-fronted Herons, *N. novæ-hollandiæ*. Troops of Emu, *Dromaius novæ-hollandiæ*, some with young ones, stalked with majestic motion among the depasturing sheep and cattle, and the Spur-winged Plover, *Lobivanellus lobatus*, ran hither and thither among these, scolding and bickering incessantly.

Owing to the heat, and the great amount of evaporation it induced, the lake's area sensibly diminished day by day. As the receding waters laid bare the Vallisneria, and the fœtid mud upon which it flourished hardened beneath the sun's rays, flocks of the Pink, *Cacatua leadbeateri*, the Rose-breasted, *C. roseicapilla*, the White, *C. galerita*, and the Blood-stained, *C. sanguinea*, Cockatoos descended upon it like locusts on a wheat-field, and, tearing it up by the roots, greedily devoured the succulent portions that still remained.

Those parts of the lake giving direct access to clear water,

or where a fence entered it, or a dry stem of a fallen bush of the introduced tobacco afforded a dry resting-place, were besieged, particularly in the early morning and towards sundown, by flocks of the Crested, *Ocyphaps lophotes*, and Bronze-winged Pigeons, *Phaps chalcoptera*, and numerous other birds, among which Barnard's, *Barnardius barnardi*, the Black-tailed, *Polytelis melanura*, and the Yellow-rumped, *Platycercus flaveolus*, Parrakeets were the most conspicuous. Small parties of Grallinas, *Grallina picata*, and White-winged Choughs, *Corcorax melanorhamphus*, were to be noted here and there, as well as the White, *Ibis molucca*, and Straw-necked Ibis, *Carphibis spinicollis*. For the most part the birds on the lake and beside its margin foraged in silence, but from the lake's selvedge of Red Gum and box timber a continuous clamour arose. In the hollow spouts of these trees Cockatoos, Parrots, Swallows, and Pardalotes were nesting, and amid their branches the Minahs, Pigeons, Wood-Swallows, Grallinas, Choughs, &c., were either building or incubating their eggs.

The peaceful conditions outlined did not always prevail. There was a time when the canoe-shaped boat that rested on the mud of the southern shore glided out into the lake's broad expanse under the impetus imparted by a pair of stout arms. Hither and thither it progressed, working the duck to a common centre, till all were congregated in a limited area. It was then the punt gun in the bow belched forth its heavy charge into the midst of the bewildered and suspicious birds, leaving them dead and dying on the surface of the water, and waking in a calm evening the echoes of the lake's surroundings for a radius, so we were informed, of ten miles. Seventy-two brace of birds is alleged to have been secured after a single discharge into a flock of wild-fowl on this lake. The extreme shyness of the water-fowl, particularly the Hoary-headed Grebe, which may be counted in scores, and which, on one coming within three hundred yards of the shore near where they happen to be, will immediately take wing to the centre of the lake, is sufficient ground on which to base the assumption that illegal shooting is consistently practised.

One can conjure up the daily scenes enacted in the now distant past, when the dark-skinned natives lined the shores of Mournpoul and the adjacent lakes; when the lubras and children waded in the shallows for mussels, or searched the lignum bushes for the eggs of the wild-fowl, or the sandy shore for those of the river tortoise; when the lake was dotted with their frail bark canoes and the smoke of the camp-fires arose through the trees, and troops of piccaninnies and dogs sported on the sand-dunes. Now all is changed. The natives have passed away, leaving little to the casual observer to indicate

their former presence. The trees whence they stripped the bark for their canoes and wurleys have grown taller and bulkier, and have done much to erase the scars inflicted by the rude stone axes of those to whom their leafy crowns afforded shelter and their piped stems retreats for the phalangers upon which they preyed. As the wind sweeps the material of the dunes before it in long, irregular ripples, and erodes deeper and more extensively into that which years ago it had accumulated, it discloses mute evidence of the former dusky inhabitants of the lakeside. Here and there one finds the site of their camp-fire, the charcoal mingled with the shells and bones of the creatures upon which they subsisted, and among these are to be found rude stone axe-heads, skinning flints, and pounding and sharpening stones. But more often it is a little pile of human bones that is encountered—all that remains, probably, of a warrior once proud of his skill in the chase, feared by his foes and respected by his associates.

If the eye during the day fails to realize the importance of Mournpoul as a factor in the welfare of our fauna and avifauna, particularly during a dry season, such as is now being experienced there, as in other parts of the State, the ear, after nightfall, is certainly impressed with the volume of sound arising from the many varieties of birds that have been compelled to resort to the lake for sustenance. As the mirrored shadows of the trees on the distant southern shore gradually merge into indistinctness, the calls of the waterfowl increase in volume. The musical note of the Black Swan, *Chenopis atrata*, resounds from every part of the lake, and, as large flocks of these birds are then continually changing their feeding-grounds, the beat of their broad-webbed feet on the surface of the water as they take wing resembles nothing so much as a number of motor-bikes at full speed. The harsh call of the Heron, the wailing cry of the Curlew, the bickering call of the Plover, the low and modulated note of the Black Duck, the rollicking, laugh-like note of the Teal, *Nettion castaneum*, and the plaintive peep of the Dabchicks as they pass in scattered but unseen procession through the Vallisneria and Curly Pond Weed not many yards distant from one's place of vantage, all crowd on the ear in a bewildering medley of sound. Overhead the whistle of the pinions of unseen flights of Black Duck, Teal, and Widgeon, *Nyroca australis*, arriving from the billabongs seems like a gale of wind among the trees, and as these birds pitch in singles, in pairs, and in companies amid the vegetable selvedge, the water foams and pulsates as if under the influence of a gentle breeze. But when darkness has completely shrouded the scene, and the birds have resorted to their usual feeding-grounds, the lake becomes comparatively

quiet. It is then when one makes a motion to withdraw from the water's edge that a startled movement by his side proclaims the presence of some unsuspected rabbit, 'possum, or emu. Before dawn the exodus of birds began, and, as our tent was pitched directly in a course favoured by most of the waterfowl proceeding northwards, we often lay in our bunks and listened to the whistle of pinions and startled cries as the birds passed overhead on their way to some muddy puddle in Chalka Creek, where that safety denied them on the lake was assured.

A noticeable feature of the flood-plain of the Murray—at least, in that portion adjacent to Mournpoul—is the large number of bleached carapaces of the River Tortoise, *Chelodina longicollis*, that are to be discerned on the sand-dunes and in the dry lake-beds and billabongs. They present every graduation in size, and are found in every stage of decay. One is at first disposed to connect their presence with the inundation of the areas on which their remains are most extensively found, and their demise to the sudden recession of the water. The facts, however, would seem to be as follow:—When the river rises and floods the low-lying country along its course, the turtles quit the main channel, range far inland, and remain behind, after the recession of the flood, in the billabongs and lake areas. These, in the course of time, gradually become desiccated, thereby necessitating the turtles seeking more advantageous environment. Selecting an occasion when a breeze blows off the river, or off any large area of water, they instinctively set out in its direction. Provided the breeze maintains its permanence, they experience no difficulty in shaping a more or less direct course, and ultimately reaching their objective. But if, as occasionally happens, the breeze fails, or veers around, they wander about in acute distress till overtaken by death. On such occasions they may be seen moving slowly and aimlessly along amid the timber or across the sand-dunes with blood oozing from the carapace and trickling down their legs, which have been worn raw by friction against the sides of the shell. In this helpless condition they are often attacked by crows and hawks.

Shortly after our arrival at Mournpoul we visited an area of Red Gum timber margining the north-western extension of Lake Yerang. In every tree Pardalotes, *Pardalotus affinis*, and Tree-Martins, *Petrochelidon nigricans*, were contending for the possession of some fancied hollow in a limb for nesting purposes, whilst Wood-Swallows, *Artamus sordidus*, were investigating the larger forks, presumably for a similar purpose. Here our attention was early attracted by the actions of a pair of Restless Flycatchers, *Seisura inquieta*, which, whilst

they ignored the presence of the Martins and Pardalotes in one particular tree, had a decided objection to a Wood-Swallow coming near it. Time after time, when *A. sordidus* had been escorted over the neutral line with more vigour than decorum, the Flycatchers would resort to a limb on their tree whereon the mud nest of a Grallina rested. Their behaviour roused our belief that the pair had taken possession of the nest, and we subsequently saw and photographed the birds arranging materials therein.

Quitting the lake-bed, after discovering the nest and four eggs of the Spur-winged Plover, we ascended a sand-ridge, and were surprised to find two graves beneath a spreading Umbrella Acacia. A little to the left we noticed the site of three dwellings that had been destroyed by fire at a not very remote date. From the presence amid the ruins of the remains of two double-barrelled breech-loading guns, a rifle, clock, watch, bedsteads, and innumerable domestic articles, it seemed at first to us that the fire must necessarily have occurred very suddenly, and, as the graves indicated, with fatal results. But the most disconcerting facts that militated against the acceptance of the assumption of an accidental outbreak of fire was that the dwellings had been situated at some distance from each other, and that it was very improbable that a fire originating in any one of them would occasion the destruction of the other two. Our individual imaginations were allowed to conjure up visions of a tragedy enacted at this spot till Monday, 14th September, when Mr. Milligan and I journeyed to Kulkyne Station, and, on mentioning our discovery, were informed that the last of the Kulkyne blacks rested beneath the acacia in the newer of the two graves. He had been a boundary rider on the station, and on his death his wife made a large excavation, lowered a bed completely dressed therein, and thereon placed the corpse. After filling up the grave she applied fire to the houses, thereby destroying all the belongings of the deceased, in accordance with a tribal custom, and quitted the district. As we stood near the grave subsequently and glanced around the narrow ridge, selvedged on all sides with giant Red Gums, between which, to the south-east and to the north, glimpses of dry and extensive lake-beds were to be had, and to the west the placid surface of Mournpoul, we could readily understand the dead man's wish to lie near those spots endeared to him from infancy by hundreds of little incidents.

In accordance with a determination arrived at the previous evening, we quitted camp for Lake Hattah early on Wednesday morning, 10th September. Pausing a short time beside the margin of Mournpoul to note the contrast presented by a

dozen Pelicans among a flock of Black Swan, we bore away south along the dry bed of Chalka Creek, whose banks were heavily timbered with Red Box and Red Gum. As we progressed Crested Pigeons were flushed in scores from the bare and fissured flood-plain, and many Emu were descried at a distance. In due course the dry and extensive bed of Lake Lockie was reached. Here, as on other lake-beds traversed, the abundance of mussel shells, and the bleached integuments of crustaceans, were noticeable. By the side of every stick that projected from the bed of the lake a small pile of broken shells was to be discerned, where, as the water shallowed under the influence of evaporation, the Cormorants, and possibly other birds—for we noted a Collared Crow-Shrike with a shell in its beak—resorted, and, fracturing one or both valves of the mussel, devoured the contents. Numerous plano-concave lime concretions, of sizes ranging from a threepenny piece to a halfpenny, were to be found at such spots. According to the belief entertained by some, these are contained in the crustaceans consumed by the Cormorants, which subsequently pass them unaltered; by others they are believed to be the result of a physiological process in the birds' intestines. If the former theory be correct, one should expect to find the concretions amid the broken chitinous integuments that are scattered thickly over the lake-beds, as well as at the places resorted to by the Cormorants.

At times on the journey we quitted the flood-plain, with its monotonous tangle of lignum bushes, and ascended the sand-dunes on our right to more closely examine the old kitchen middens of the aborigines. On the crests and sides of the dunes vast numbers of aged, weathered, and prostrate trees of *Acacia salicina* were to be discerned. All bore the appearance of a contemporaneous cessation of vitality that had ensued many years ago, and was not occasioned by fire. No seedlings were seen, and none were noted in any of our many and extensive rambles in the neighbourhood of Lake Mournpoul. Of the half-score, or thereabouts, of living trees met with during our peregrinations, to only two could the terms healthy and vigorous be justly applied. It would seem, in the locality under review, at all events, that the Willow Acacia, either from some natural cause or lack of adaptability, is doomed to extinction at a not very remote date.

Lake Hattah was reached about 11 o'clock. Owing to the want of rain, to extensive evaporation induced by months of torrid heat, and to the continuous pumping operations of the Railway Department—the engines at Hattah railway station, about four miles distant, are supplied with water from the lake—we found the lake-bed comparatively dry. On the small

area of shallow water that still existed, at least 3,000 Black Duck, Teal, and Widgeon were assembled, in company with innumerable Black Swans, Pelicans, Ibises, Herons, Maned Geese, Grebes, Cormorants, &c. When this concourse of wild-fowl was induced to take wing the roar of their pinions and kaleidoscopic movement may be better imagined than described. Here, as elsewhere, it was noted that the stately Pelican was deemed to be the Ishmael of the aquatic tribe, to be shot at and destroyed by the sportsmen of the district when an opportunity presented.

After spending half an hour beside the lake-bed, in contemplation of the birds on the water, or in viewing the evolution of the Herons, Ibises, and Pelicans in the blue vault above us, we made a traverse of about a mile due west, and then bore northwards towards our camp. This procedure brought us into a different class of country than any we had previously encountered. The monotonous, dry, and fissured lake-beds, destitute of aught green (if we omit occasional meagre specimens of the Small-leaved Swainsona, *S. microphylla*, and the Mallow of Nice, *Malva nicaensis*), gave place to a dense growth of Swamp Saw-Sedge, *Lepidosperma longitudinale*, among which vast numbers of sturdy Red Gum and Red Box trees flourished. Between these grew the Narrow-leaved Bottle-brush, *Callistemon linearis*, the Prickly Bottle-brush, *Callistemon brachyandrus*, and the Showy Honey Myrtle, *Melaleuca acuminata*, ofttimes with the Small-leaved Clematis, *C. microphylla*, sprawling over them. Birds of many varieties, the Nankeen Night-Heron, *Nycticorax caledonicus*, among others, were noted hereabouts, and also a number of kangaroos. On emerging from the timber on to the sand-dunes we beheld the unusual sight of a flock of forty Emus. The birds, however, were exceedingly timid, and raced off long before we were within photo. range of them.

Close to Mournpoul a splendid and shapely tree of the Weeping Pittosporum, *Pittosporum phillyraeoides*, and two sturdy specimens of *Acacia salicina*, just bursting into bloom, were met with. Beneath the larger of the two Willow Acacias the presence of a Sleeping or Rugged Stump-tailed Lizard, *Trachysaurus rugosus*, was revealed to us by the behaviour and incessant scolding of a Black-and-White Fantail. Another of these sluggish creatures was encountered subsequently among a growth of False Spinifex, *Triodia irritans*, amid the mallee. Efforts were made to rouse it to some semblance of vitality, but without success, till, in a tired way, it took the proffered cork of a bottle of diluted formalin in its mouth. The amount of energy this simple device generated in the lizard was a revelation. We had pitched our tent beneath the spreading branches of a Black Box growing on the margin of a lake-bed,

This area had undoubtedly once formed part of Lake Mournpoul, but had been cut off from the main depression by a low ridge, composed chiefly of sand. The two factors instrumental in its formation were wind transport of sand during periods of drought, when the area was rendered amenable to æolian forces, and water transport of *débris* during periods of flood. The dense growth of Red Gums that flourished on this narrow ridge, and at a distance of 150 yards, or thereabouts, from the waters of Mournpoul, afforded some measure of protection from any southerly gales that might arise during our sojourn. To the west and north we were well sheltered by a sand-dune, whereon the ubiquitous Thickheads formed a dense sward, and effectively checked wind erosion, which was only too evident in those portions of the neighbouring dunes where this viscid composite had failed to establish itself.

To the east the level expanse of lake-bed, invested in places by large growths of the Tangled Lignum, with acacias, eucalypts, and casuarinas interspersed, though it gave no protection from the elements, afforded us a splendid vantage-ground for observation. Here the Black-faced Kangaroos were noted on their way to the lakeside, and, among the more familiar types of birds, the Black-tailed Native-Hen, *Microtribonyx ventralis*. Crested Pigeons were exceedingly numerous on and in the neighbourhood of the bed of Lake Konardin, a short distance to the north of the camp. On one occasion a flock of not less than 100 individuals was flushed by Mr. Milligan and myself. Towards sundown, and shortly after sunrise, they were to be seen in large and small companies, winging their way towards Mournpoul to quench their thirst. Emus were practically never absent from the vicinity of our camp. Whilst clearing up after lunch on Wednesday, 10th September, a party of nine ventured to within thirty yards, and, after intently regarding us for a short time, wandered off across the dunes in their usual aimless manner. One bird in particular was repeatedly encountered at the lakeside. Old age seemed to have rendered it incapable of keeping up with the members of any one of the many small flocks that ranged the adjacent countryside, and thus doomed it to a solitary existence—an associate of cattle and of sheep. Strange to relate, these birds are regarded with more aversion by station hands than kangaroos. This arises from their habit of damaging, so it is alleged, the wire netting attached to fences, thereby allowing rabbits free ingress to enclosures from which they had been previously expelled after the expenditure of much time and labour.

Shortly after our arrival at Mournpoul we set out early one morning to explore the recesses of the Mallee, about a mile distant to the north of our camp. Sand-dunes, of considerable

elevation, and having a more or less east and west extension, intervened. Among some of the many robust pines by which they were clothed, a number of Pink Cockatoos (Major Mitchell), *Cacatua leadbeateri*, were noticed, and on reaching these trees we found the ground beneath them littered with cones that had been frayed and torn by the birds in their quest of the seeds they contained. Ascending a stiff slope, we found ourselves on the fringe of a vast expanse of tender green foliage that extended in front and on either hand to the sky-line. Along the crest of this ridge *Eucalyptus incrassata*, Giant Mallee, was flowering freely, but not elsewhere. This long, narrow selvedge of flowering gums proved to be the rendezvous of many varieties of honey-eaters. Thither we resorted almost every day, at various hours, and invariably found something new in bird-life to reward us. Here *Ajuga australis*, Australian Bugle, and *Microseris Fosteri* were to be seen growing luxuriantly among the branches of the fallen timber, and in less favourable situations *Blennodia lasiocarpa*, Hairy Blennodia, *Calotis hispidula*, Hairy Burr-Daisy, *Alyssum minimum*, Desert Alyssum, and *Clematis microphylla*, Smaller Clematis. Several robust growths of the Twining Fringe Lily, *Thysanotus Patersoni*, were met with, and one ragged specimen of the Native Poplar, or Bell-Fruit, *Codonocarpus cotinifolius*.

Although we ranged extensively over the flood-plain and amid the adjacent Mallee areas during our sojourn at Mournpoul, we met with but one tree of the Sweet Quandong, *Fusanus* (*Santalum*) *acuminatus*. This was found on the ridge previously referred to, and was heavily burdened with fruit. The Large Dodder Laurel was much in evidence, particularly on the outskirts of the Mallee. One large tree of *Eucalyptus incrassata*, Giant Mallee, was noted bearing an enormous mass of this parasitical growth. Close at hand another was observed to have been uprooted by wind pressure on the balloon-like interlacement of stems it had for many years nourished and supported.

Whilst ranging through the Mallee we realized, at a very early stage in our peregrinations, that caution had to be exercised in the choice of a site whence to view a foraging bird. At every few yards the extensive and crater-like nests of the *Myrmecia nigricipes* were to be encountered. These ants appeared to be always spoiling for fight, and if one of us inadvertently approached within half a dozen yards of a citadel, or, for that matter, allowed his shadow to fall upon it, out they would pour in myriads, and, with gaping mandibles, skirmish over a large area in quest of the offender. Mr. Rosenhain's efforts to secure a photo. of a nest of these militant ants were many, and mostly unsuccessful. In the vicinity of "Aster Ridge" several trees of the Scented Peppermint

Eucalyptus odorata, were found, and a much-cropped specimen of *Acacia brachybotrya*, Silvery Acacia.

Prior to breaking camp on Friday, 18th, Mr. Milligan and I ventured on a very early and hurried visit into the Mallee, which proved highly interesting. We returned about noon, and, after exchanging greetings with Johnny, who had just arrived with the buggy and pair, sat down to lunch. An hour later, as we were about to set out for Kulkyne, the cause occasioning a sudden and noisy demonstration on that portion of the lake in proximity to our camp was revealed when a Black-cheeked Falcon, bearing in its talons a Hoary-headed Grebe, passed within a few yards of us. Save the unusual sight of half a dozen bats, disturbed either by the noise of the buggy or the vibration it imparted to the hollow tree in which they had been ensconced, flitting about in the bright sunshine, little of moment occurred on the journey. The forenoon of Saturday was spent wandering around among the saltbush, and noting the birds and vegetation. After lunch we proceeded to Chalka Creek to ascertain the effect of the previous day's phosphorus poisoning by the station hands on the rabbits. None were found dead, but a large number were observed in what might be termed a very "groggy" condition. These unfortunates afforded the dogs exciting courses, and invariably disappeared at the critical moment into a convenient hollow log.

Under Mr. Thompson's guidance we visited a shallow depression, of no great size, situate in the vicinity of Chalka Creek, and containing, possibly, a few thousand gallons of filthy water. This was the rendezvous of at least 600 Black Duck, Teal, and Widgeon, which had resorted hither from Lake Mournpoul, and had done so for many months. The area of water being too small to accommodate the flock, the birds lined its edges in close array and extended back some distance on the bare, parched, and feather-strewn ground. Photos. of this interesting scene were obtained.

Late that evening our conveyance arrived from Mildura, and early the following morning we reluctantly bade adieu to our Kulkyne friends, and set out on our return journey. Mildura was reached about 8 p.m., after a hot, dusty, and tiresome drive.

The Black-and-White Fantail.—During the past season I have had the pleasure of observing in Studley Park the activity in breeding of those extremely useful birds the Black-and-White Fantail, *Rhipidura motacilloides*, Vig. and Hors. I had four pairs of birds under observation, and found that three pairs reared no less than three families each between the months of August and December. The other pair of birds was disturbed after their first clutch, and may have built in

another place. As we had such a dry spring season, I was for a time puzzled how the birds could find food (insect life) for so many families; but at last I noticed that the birds had each time built over a small irrigation drain, which, causing the grass to grow, yielded the desired food. I have brought this under notice to emphasize the fact that it is very necessary to fight persistently for the lives of our feathered friends.—J. Gabriel. Kew, 10th May, 1915.

Magpie's Nest in a Curious Position.—During a recent visit of my daughter to Lorne, she was shown by a resident, Miss M. H. Gaynor, a magpie's nest, which the bird (a tame one) had built in a most extraordinary place—viz., on a bedroom dressing-table. The nest, a photograph of which has been kindly sent to me, is built of twigs of wood, pieces of coloured cloths, rope, and fencing and other wire. During the process of building Miss Gaynor placed a piece of wire across the nest; this was, however, cast on to the floor, but was replaced by the bird itself a day or two afterwards. A small mirror on the table was moved aside, and a pincushion was pushed on to the floor. As the breeding season is in July, August, and September, it is a puzzle why the bird should choose the latter end of the summer for its work. Two wild magpies—father and son—have of late been "whistling at the gate," and our lady shows distinct preference for the son. The nest has been promised to me for museum purposes.—J. Gabriel. 10th May, 1915.

The Warbling Grass-Parrakeet.—Towards the end of 1913 Mr. Ernest Williams, of Bennett-street, North Fitzroy, brought four young Warbling Grass-Parrakeets (*Melopsittacus undulatus*) from the Murrumbidgee River. They were turned loose in a large box cage. One of the females escaped, but in July last the other one laid a clutch of eggs and reared six young ones. Immediately the young ones left the nest the mother laid again, and reared six more. She continued at this rate until twenty-four young ones were flying. Thinking breeding was over, Mr. Williams cleaned out the cage and scalded the log, returning the pair of old birds to the cage. In a few days the female laid again, and the last lot must have consisted of nine eggs, as two were thrown out, each containing a young one. Mr. Williams then tipped up the log into his hand, and seven live young ones rolled out, some nearly feathered and others very small. They are all flying now. Thus they have reared thirty-one young ones since they commenced breeding in July. This does not represent all the eggs laid, as on several occasions eggs were found on the floor of the cage. I have frequently visited Mr. Williams and watched the progress of this remarkably prolific pair of birds, some of whose progeny are now in my aviary.—G. A. Keartland.

The Victorian Naturalist.

Vol. XXXII.—No. 3. JULY 8, 1915. No. 379.

FIELD NATURALISTS' CLUB OF VICTORIA.

The thirty-fifth annual meeting of the Club was held at the Royal Society's Hall on Monday, 14th June, 1915.

The president, Mr. J. A. Kershaw, F.E.S., occupied the chair, and about 40 visitors and members were present.

REPORT.

A report of the excursion to the National Museum on Saturday, 12th June, was given by the leader, Mr. J. A. Kershaw, F.E.S., who intimated that twelve members attended at the time appointed. A visit was first made to the library, and thence to the cataloguing department, where the system adopted by the Museum for the identification and particularization of each specimen purchased, presented, or received by exchange was explained. The carpenters' workshop was next inspected, and the details of the construction of a large show-case, nearing completion, gone into. The party then proceeded to the work and finishing rooms. In the former the various processes of skinning the animal received and preparing the skin and skeleton for mounting were illustrated by means of the remains of a young hippopotamus and an alligator. In the latter, finished specimens—one being an albatross having a wing spread of over nine feet—and others in the course of completion were examined. An inspection of a small portion of the entomological collection was made, and the manner of mounting and particularizing specimens demonstrated. A collection of butterflies, and some rare skins of Birds-of-Paradise, were shown, and occasioned considerable interest—the former by their iridescent play of colour, and the latter by the delicate nature of the rich-hued plumes and the varied forms assumed by the naked feather-shafts. A visit was next paid to the basement of the Museum, in the bays of which are stored thousands of specimens of fishes, crustaceans, &c., in spirit. These specimens, it was pointed out, were not made available for inspection by the general public. In order to preserve the natural colouring of the specimens, and to conserve the spirit in which they were placed, it was necessary to eliminate daylight as far as possible; hence their storage in the dimly-lighted recesses. The Australian Court was finally visited, and partially inspected, and about 5 o'clock the party dispersed, after having expressed themselves well pleased with their visit.

ELECTION OF MEMBER.

On a ballot being taken, Miss Enid Ballhausen, "Strathroy," Barker's-road, Auburn, was duly elected as an ordinary member of the Club.

GENERAL BUSINESS.

Mr. O. Rosenhain said he desired to remove the erroneous impression entertained by some members of the Club respecting his nationality. He was a native of South Australia, and his father and mother had resided in that State for the greater part of their lives.

The president said that he deeply regretted having to announce the death of Captain E. F. R. Bage and of Lance-Corporal Cuthbert Kaufmann at the front. Both young men were sons of old and valued members of the Club, and had sacrificed their lives willingly and nobly at the Empire's call. He proposed that the sympathy of members be conveyed to Mrs. Bage and to Dr. Kaufmann in the regrettable loss they had sustained. The resolution was seconded by Mr. J. Shephard, and carried in silence.

ANNUAL REPORT.

The hon. secretary, Mr. J. G. O'Donoghue, read the thirty-fifth annual report, for the year 1914–15, which was as follows :—

"To the Members of the Field Naturalists' Club of Victoria.

"Ladies and Gentlemen,—In submitting for your consideration and approval the thirty-fifth annual report of the Club, the committee are pleased to be in the position to announce a financial gain of £7 8s. for the year ended 30th April, 1915. Small though the gain undoubtedly is, it is a matter for felicitation, since it has been achieved during a period of severe commercial depression, induced primarily by an abnormally dry season, that has adversely affected the greater part of the State, and to a lesser degree by the far-reaching consequences of the outbreak and continuance of the greatest armed conflict the civilized world has ever known, and, let as hope, ever likely to again experience.

"On the other hand, it is with regret the committee have to announce a reduction in the Club's membership for the period specified. The year was commenced with a membership of 236, and during its continuance 3 associates, 3 country, and 15 ordinary members were elected, whilst 4 associates, 14 country, and 13 ordinary members were lost by resignation or arrears, and 16 junior members by the repeal of clause (*e*) of rule 4 at the special general meeting of the Club on the 8th September, 1913.

"The membership now amounts to 210, and comprises 2 life members, 6 honorary, 145 ordinary, 53 country, and 4 associates.

"That the loss disclosed by the foregoing analysis is a serious one cannot be denied, but, in view of the palpable effects of the two adverse factors previously adverted to, our position might be infinitely worse. As times mend, the Club can confidently look forward to fresh accessions to its ranks from the large rising generation of naturalists, among whom will be found many eager and willing to promote and carry on the good work so well and faithfully conducted for many years by the majority of those present.

"In conformity with the custom of their predecessors, the committee arranged a varied programme of excursions for the year 1914–15. That their efforts were duly appreciated by members was evidenced by the large attendance at the various outings. By reason of closer settlement and consequent cultivation, each succeeding committee experiences increasing difficulty in selecting suitable localities for the Club's Saturday afternoon excursions. This difficulty is becoming more accentuated each year, and it would seem that the time is not far distant when these will be the exception rather than the rule. In the April and May issues of the *Naturalist* an appeal was made to members for suggestions respecting new and suitable localities for excursions; but the response was so meagre as to hardly compensate for the time expended in inditing it.

"Of the four extended excursions arranged, two—Baw Baw (28th November to 3rd December) and French Island (1st to 5th April)—had to be abandoned owing to insufficient response on the part of members. The National Park, Wilson's Promontory, was again selected for the Christmas camp-out (26th December to 2nd January). Under the able leadership of Mr. J. A. Kershaw, F.E.S., who considered neither time nor inconvenience when the comfort or the enjoyment of those participating was concerned, the outing proved as interesting and instructive as the previous ones. From a permanent camp on the Tidal River, the party of twelve visited many of the most accessible beauty spots in the neighbourhood. A report of the trip, illustrated by a number of lantern slides, was given by the leader at the January meeting, and was highly appreciated. To mark their recognition of the efforts of the Committee of Management of the National Park to cater for the convenience and comfort of visitors out of the small sum of money at their command, the visiting naturalists contributed five shillings each towards the better domestic equipment of the rest houses, and it is pleasing to record that the example thus set has been productive of similar donations from other sources.

"The thanks of the Club are due to the leaders of excursions during the year, not only for their sacrifice of time, but also for the interesting reports furnished, and to Mr. and Mrs. J. R. Tovey, Mr. and Mrs. F. Pitcher, Mr. and Mrs. F. Wisewould, Misses Keble and Major, and Mr. R. A. Keble, for the kindness and consideration extended to members on the occasion of the Mentone, Botanic Garden, and Pakenham outings.

"The thirty-first volume of the Club's journal and magazine, *The Victorian Naturalist*, has been published, and, under the able editorship of Mr. F. G. A. Barnard, has once more attained the high standard of excellence that has been for many years past its characteristic feature, and that has resulted in establishing an increasing demand for it by scientific societies throughout the world, by reason of the unique and reliable information it contains respecting Victorian natural history. The Club has, therefore, to again record its thanks to Mr. Barnard for the able manner in which he discharged the duties of his honorary position, and to those members who, by their contributions, papers, and notes, render the journal of such interest and importance.

"In addition to a number of interesting natural history notes, fourteen papers, dealing with a variety of subjects, were read at the Club's meetings during the year. Of these, two were illustrated by lantern slides, as was Mr. J. A. Kershaw's report of the Wilson's Promontory excursion. Mr. E. E. Pescott's lecturette on 'Some Victorian Wild-Flowers,' and Mr. E. O. Thiele's lecturette on 'Portuguese East Africa.' The following is the list of authors and papers:—Mr. R. A. Bastow, 'Victorian Hepaticæ (Liverworts)': Mr. F. Chapman, A.L.S., (*a*) 'Note on a Large Specimen of *Conus Dennanti*,' (*b*) 'On an Impression of the Fruit of *Casuarina* or Sheoak in the Newer Basalt of Victoria'; Mr. W. Davey, F.E.S., 'Notes on English and Japanese Newts in Victoria'; Mr. J. C. Goudie, 'Notes on the Coleoptera of North-Western Victoria,' Part VI.; Messrs. J. H. Gatliff and C. J. Gabriel, 'Alterations in the Nomenclature of Some Victorian Mollusca'; Dr. T. S. Hall, M.A., D.Sc., 'Notes on the Gippsland Lakes' (illustrated); Mr. Reginald Kelly, 'Plant Distribution in the Healesville District'; Mr. J. A. Kershaw, F.E.S., 'A Naturalist in Northern Queensland'; Mr. G. A. Keartland, 'On the Specific Name of the Blood-stained Cockatoo, *Cacatua sanguinea*, Gld.'; Mr. C. H. Lees, C.E., F.R.A.S., 'What is Nardoo?'; Mr. J. G. O'Donoghue, 'Wanderings on the Murray Flood-Plain'; Mr. P. R. H. St. John, 'On the Smilarity of two Species of Banksia, *Banksia collina* and *Banksia spinulosa*'; Mr. E. Shaw, 'Australian Blattidæ: I.—Preliminary Description of New Species.'

"In compliance with a request made that the members of the Club interested in microscopical research might be afforded an opportunity of displaying some of the wonders and beauties of the microscopical world at one of the ordinary meetings, the committee arranged that the evening of the 10th August be devoted to this purpose, and, though the resulting display did not represent the best efforts of those concerned, it was interesting and instructive to many, and could well bear repetition at an early date.

"Last year the British Association for the Advancement of Science held its meetings in various State capitals of the Commonwealth. The inauguration of the president-elect, Professor William Bateson, held in the Auditorium, Collins-street, on Friday, 14th August, was witnessed by a large and distinguished concourse of people, who subsequently listened with interest to his able and exhaustive address on 'Heredity.' On Tuesday afternoon, the 18th August, the visiting scientists were welcomed by the Victorian Executive for the B.A.A.S. and various scientific societies of the metropolis at a garden party in the Botanic Gardens. The Club was well represented at this function, as well as at other meetings of the Association.

"The usual annual exhibition of wild-flowers was held in the Royal Society's Hall at the October meeting, but, owing to the abnormally dry season, the display was very meagre, and inferior to those of previous years. Nevertheless, an interesting exhibit of many of our common native plants resulted from the praiseworthy efforts of a small and enthusiastic band of collectors. On this occasion, as on the occasions of many similar exhibitions, Mr. J. Gabriel devoted much time and labour in making provision for the various collections forwarded. The thanks of the Club are due to this veteran naturalist for his services, to the collectors and exhibitors of flowers and specimens, and to those assisting in the arrangement and identification of exhibits, and to the *Age* proprietary for the supply of paper for covering the tables on this and many similar occasions.

"At the July meeting, the innovation of requesting exhibitors to make some brief comment on their exhibits was initiated. By this means the committee believed a far greater amount of interesting and instructive information would be forthcoming than under the system heretofore prevailing. So far the results accruing have not been as good as was anticipated, but, as members become more familiar with the system and realize its possibilities, better consequences may be confidently expected. Whilst a general consensus of opinion exists regarding the latent advantages of the innovation mentioned, members are more or less divided on the advisability of con-

tinuing or eliminating the ten minutes' adjournment for the examination of exhibits that ensues immediately after the termination of the remarks thereon. A three months' trial was given this mode of procedure, and at the expiration of the term its continuance was re-affirmed by a large majority at the September meeting. A reversion to the old system was advocated at the April meeting, and, after some little discussion, the continuance of the interval for a further period of six months was agreed to, subject to the proviso that the application of the principle would be suspended on lantern nights, or when a lengthy paper was to be read.

"Acting on the representations made by two members at the December meeting, the Club interested itself in advocating the reservation of a sanctuary for native game on the flood-plain of the Murray in the parishes of Gayfield, Cantala, Brockie, Yelwell, and Kulkyne. Partially due to the Club's efforts, to those of the Acting Chief Inspector of Fisheries and Game, Mr. F. Lewis, and others, an extensive area, embracing a portion of Chalka Creek, Lakes Hattah, Little Hattah, Lockie, Brockie, Mournpoul, Yelwell, and Konardin, in the parishes mentioned, together with all land within half a mile of such creek and lakes, was proclaimed a sanctuary for native game.

"The Club's meetings, whilst being well attended, averaging over fifty members and visitors during the year, show a regrettable falling-off in the number of exhibits and natural history notes. As these two factors materially assist in enhancing the attractiveness of the meetings, and in widening the scope of members' information generally, it behoves all interested in the Club's welfare to assist, by precept and example, to place these two important items on a better plane than they now occupy.

"The Plant Names Committee is still devoting its energies to the task of furnishing our native plants, shrubs, and trees with provisional vernaculars, and confidently hope to bring its lengthy and arduous task to a successful termination at an early date.

"Dr. C. S. Sutton, hon. secretary Plant Names Sub-committee, reports as follows:—'During the past year the Plant Names Sub-committee held five meetings and completed the revision of the provisionally adopted vernaculars hitherto unpublished. It will be remembered that those of the Monocotyledons and Cryptogams appeared in the *Journal of the Department of Agriculture of Victoria* of June and August, 1911, and those of the first portion of the Dicotyledons, from Dilleniaceæ to Haloragaceæ, in the *Journal* of July and September, 1912, and February, 1914. The remaining section, now having been dealt with, is in the hands of the editor, and will no doubt

appear in sections as space becomes available. Concurrently with the work of the sub-committee, the Government Botanist, Dr. Ewart, has been revising the "Recording Census"; and when it is stated that many more than four hundred alterations have been made in it, it will be realized that the revised list of our plants will present a quite strange appearance to those who only know that of the second volume of Mueller's "Key to the System of Victorian Plants." Eight ordinal names will have their endings changed to 'aceæ' instead of 'eæ;' twenty-nine generic names and more than two hundred specific names have been altered, most of the latter as regards their endings and the authorities. Forty-four genera have been added and eighty species admitted, and thirty-four species and a few genera deleted. Whilst awaiting publication of the last section of vernaculars, the sub-committee will devote its attention to the further revision of those already printed, in the light of the all too few suggestions sent in by those to whom copies of the reprints have been forwarded.'

"The Club's library has received a number of valuable additions during the year, principally by way of exchange with scientific societies in the other States, and other parts of the world. Members still fail to make the use of it which its value deserves.

"The Club is again under a great obligation to Messrs. Coghill and Haughton for their generosity in placing their office at 79 Swanston-street at the disposal of the committee for the holding of meetings.

"In conclusion, whilst congratulating members on the prosperity enjoyed by the Club, the committee urge upon them the necessity of energetic individual effort to secure fresh acquisitions to their ranks and to promote and maintain the present position of the Club in the domain of science by communicating the result of their researches and observations at the meetings.

"On behalf of the committee,

"J. A. KERSHAW, *President.*

"J. G. O'DONOGHUE, *Hon. Secretary.*

"*26th May*, 1915."

In moving the adoption of the report, Mr. F. G. A. Barnard urged upon members the necessity of studying more closely the natural economy of plant, insect, and animal life, and to submit their investigations or observations in the form of a paper at a meeting of the Club. Whilst interesting and instructive matter was contributed to the *Naturalist*, practically no short notes dealing with original investigations amongst the groups mentioned were tendered.

The motion for the adoption was seconded by Mr. F. Pitcher, and carried.

FINANCIAL STATEMENT.

The hon. treasurer, Mr. G. Coghill, read the financial statement for 1914-15, which was as follows:—

RECEIPTS.

To Balance, 30th April, 1914				£36 14 11
,, Subscriptions—				
Ordinary Members ...	£113 19 6			
Country Members ...	23 19 11			
Associates	2 14 6			
		£140 13 11*		
,, *Victorian Naturalist*—				
Subscriptions and Sales	7 2 6			
Subscriptions in advance	0 6 6			
Advertisements ...	6 15 0			
Reprints	2 13 3			
		16 17 3		
,, Sales of Badges		0 4 6		
,, Interest, Savings Bank		1 15 7		
,, Sale of Tickets, British Association Garden Party		4 7 6		
				163 18 9
				£200 13 8

*Subscriptions:—Arrears, £26 2s. 6d.; 1914-15, £107 4s. 5d.; 1915-16, £7 7s.—total £140 13s. 11d.

EXPENDITURE.

By *Victorian Naturalist*—				
Printing	£75 10 11			
Illustrating	6 8 3			
Free Reprints	5 15 3			
Reprints	3 19 9			
		£91 14 2		
,, *Victorian Naturalist*—				
Wrapping and Posting		14 19 11		
,, Rooms—Rent and Attendance		13 10 0		
,, Library—Periodicals ..	5 15 0			
Binding ...	4 9 6			
Insurance and Postage	1 18 3			
		12 2 9		
,, Hire of Lantern		4 2 0		
,, Printing and Stationery		6 12 0		
,, Postages, &c.		8 19 11		
,, Wild-flower Exhibition—Carriage		0 2 6		
,, British Association Garden Party		4 7 6		
			£156 10 9	
,, Balance in Savings Bank ...		32 8 5		
,, ,, London Bank		10 17 6		
,, ,, hand		0 17 0		
			44 2 11	
			£200 13 8	

G. COGHILL, *Hon. Treasurer.*
28th May, 1915.

Audited and found correct.
J. STICKLAND, } *Auditors.*
J. WILCOX, }
9th June, 1915.

The following statement of assets and liabilities was also read:—

ASSETS.

Balance—Savings Banks, London Bank, &c.... ...	£44	2	11
Arrears of Subscriptions (£49), say...	35	0	0
Arrears for Reprints	1	5	0
Badges on hand	0	19	3
Library and Furniture (Insurance Value)	150	0	0
	£231	7	2

LIABILITIES.

Subscriptions paid in advance	£7	13	6

One of the auditors, Mr. J. Wilcox, appointed to audit the accounts of the Club for the year 1914–15, complimented the hon. treasurer on the excellent manner in which he had presented his books and vouchers.

ELECTION OF OFFICE-BEARERS FOR 1915–16.

The following office-bearers, being the only nominations received, were declared duly elected:—President, Dr. C. S. Sutton; vice-presidents, Mr. F. Pitcher and Mr. A. D. Hardy, F.L.S.; hon. treasurer, Mr. G. Coghill; hon. librarian, Mr. P. R. H. St. John; hon. editor, Mr. F. G. A. Barnard; hon. secretary, Mr. J. G. O'Donoghue; hon. assistant secretary and librarian, Mr. W. Glance. On a ballot being taken for five members of committee, Messrs. F. Chapman, A.L.S., J. Gabriel, J. A. Kershaw, F.E.S., O. Rosenhain, and J. Searle were duly elected.

PAPER READ.

By Miss Amy Fuller, entitled "Some South African Scenes and Flowers."

The author pleasantly described the different zones of country passed through during the train journey of 1,660 miles from Cape Town to the Victoria Falls, on the Zambesi River, Rhodesia, and the type of vegetation nourished by each. The high esteem in which many of our despised trees and plants are held in South Africa was evidenced by groves of Blue Gums and luxuriant hedges of the Coast Tea-tree at most of the farms throughout the colony and in Rhodesia. The visit made to the falls, which are one of the natural wonders of the world, was vividly described, and the feeling of awe which is experienced on beholding the broad Zambesi suddenly plunging into a chasm ranging from 250 to 350 feet in depth was vividly portrayed.

The paper was rendered doubly interesting by the exhibition of over 200 water-colour drawings of flowers gathered around Cape Town or during the trip mentioned.

In complimenting the author on her excellent paper, Mr.

E. E. Pescott said it was a pity that our native shrubs were not utilized more for hedges. They were infinitely superior in every respect to privet and other such introductions which most people fancied.

The president, Dr. C. S. Sutton, Mr. F. Pitcher, Mr. F. G. A. Barnard, and Mr. A. D. Hardy also spoke.

NATURAL HISTORY NOTE.

Mr. J. Gabriel said that he had recently exhibited a photograph of the nest of a magpie constructed on a diningroom table. A few days ago he received a photograph of the nest of a robin built on a mantelpiece.

BOTANICAL NOTE.

Mr. E. E. Pescott, F.L.S., drew attention to a paper contributed to the Royal Society of Victoria by Dr. R. S. Rogers, M.A., of South Australia, entitled "Notes on Certain Species of Pterostylis." On examination of specimens and drawings from Kew, England, Dr. Rogers determines that *Pterostylis Mackibbini*, Mueller, is identical with *P. cucullata*, Brown, and that the former name must be considered as a synonym of the latter plant. The plant that has been long known in Victoria as *P. cucullata* has been named *P. falcata* by Dr. Rogers, while its alpine variety now becomes *P. alpina*. Thus, two new species of Pterostylis are to be added to the Victorian list of orchids.

EXHIBITS.

By Miss Amy Fuller.—200 coloured drawings of South African wild-flowers, in illustration of her paper.

By Mr. F. G. A. Barnard.—Penholders made from various Mallee woods

By Mr. J. Booth.—*Leptospermum scoparium*, R. and G. Forster, Broom Tea-tree, showing exudation of manna.

By Mr. E. E. Pescott, F.L.S.—Herbarium specimens of two new species of Pterostylis—*P. falcata*, R. S. Rogers, and *P. alpina*, R. S. Rogers; also *P. cucullata*, R. Brown, syn. *P. Mackibbini*, F. v. M.

By Mr. F. Pitcher.—Blooms of four species of acacias now flowering in the Melbourne Botanic Gardens—viz., *A. Baileyana*, F. v. M., Cootamundra Wattle, *A. juniperina*, Willd., Prickly Wattle, *A. myrtifolia*, Willd., Myrtle-leaved Acacia, *A. podalyrifolia*, A. Cunningham, Mount Morgan Acacia.

By Mr. J. Searle.—Cordylophora; *Parartemia Zietzeana* (?); three species of Copepoda, not hitherto recorded, from Lakes Corangamite and Colac; also a living specimen of the freshwater crab, Hymenosoma, sp., from Richmond.

By Mr. J. Shephard.—Rotifer, genus Brachionus, parasitic on *Daphnia carinata*, from Lake Colac.

After the usual conversazione the meeting terminated.

NOTE ON THE CONTRACTILE VACUOLE.

By A. D. HARDY, F.L.S., F.R.M.S.

(*Read before the Field Naturalists' Club of Victoria, 12th April,* 1914.)

WHILE engaged on the examination of some sphagnum from Mount Baw Baw (*Victorian Naturalist*, March, 1914), my attention was arrested by a protozoon which, though not at first, at a later stage seemed like a form of Amœba, possibly a young *A. proteus*; but, as I am not well informed as to the behaviour of vagrant Rhizopods escaped from tests, such as Difflugia and Arcella, and, as will be seen, this organism differed in many respects from Amœba, the identity must remain unsolved.

When first seen the animal was slowly moving in a straight line across the field of view, without any alteration of shape, this symmetrical form being kept continuously throughout the greater part of the half-hour during which it was under observation, progression being in a direction indicated by the long axis of the cell with the obtusely rounded end foremost. The most careful scrutiny revealed no sign of organs of locomotion, such as cilia or flagellum. Observation of the organism as a whole and of its contractile vacuole absorbed my attention to the exclusion of other interesting matters, such as the nucleus, which, if present, was indistinct. During the steady rectilinear progress of the cell, which appeared to move in a slug-like manner, there was a rhythmic production of a vacuole which regularly came first into view at a point near the extremity of the attenuated posterior end. It moved forwards in an axial line to near the anterior end and back again to the posterior, where it disappeared.

During half an hour there were six such formations, the time occupied by each course being about five minutes. The time covering diastole and systole, as recorded for other forms by several observers, appears to be about 60 seconds.

There was no systole in the usual acceptation of the term. Instead, the vacuole enlarged from the time of its origin until its sudden collapse, or escape, with almost explosive force at the extremity of the cell.

On reappearance, the presence of the vacuole, now minute, was betrayed by its movements. As it moved along the cell its progress was at a rate distinctly less than that of the protoplasmic stream. It has been suggested by one writer that as the vacuole fills it becomes heavier than the endoplasm surrounding it and so lags behind, the observation being made in connection with Amœba. Constantly increasing, it paused momentarily near the cells anterior, and then began its retrograde course, during which it apparently increased in size,

until, near the acute extremity, it was too large to pass further into the angle formed by the converging limits of the cell. This extremity, however, accommodated itself to the size of the vacuole, and distended to allow of its passage, such granular matter as would have been otherwise imprisoned having, as it were, in anticipation, moved round to the other side. During the fraction of a second there seemed to be a limiting hyaline film common to cell and vacuole. Then the funnel-like distension collapsed, and either the water from the vacuole escaped and the latter began invisibly its diastole, or else the globule of water was ejected and a *new* vacuole formed, the movement being too sudden to allow of certainty of observation.

It would have been difficult—perhaps impossible—to fix the point of origin of the succeeding vacuole. I used an Abbé condenser, and with magnification of 500 diameters its appearance was first noticed, at about 10μ from the apex, its diameter being then about 2μ, and the length of the cell about 100μ.

Meanwhile, there was a steady forward streaming of the protoplasm, but I failed to notice any return current, and there was no contraction of any part of the cell visible to cause the stream. [Wallich suggested that the forward flow of the plasm in Amœba was due to the contraction of the after part of the cell.]

The subsequent behaviour of the organism may have been due to the fact that the drop of water on the slide was evaporating and desiccation approaching. Soon after the collapse of the sixth vacuole, and just when another was expected to come into view, a pseudopodium was near that spot laterally produced; the forward movement of the cell ceased, the protoplasmic stream slowed down and seemed troubled, and the pseudopodium, with its own stream accelerating, developed rapidly into a broad, blunt lobe. Next, from a form roughly bilobed, the cell became approximately stellate, with blunt rays; and after a few minutes, during which there was no nucleus or vacuole visible, the organism encysted, the cell being then spherical, with the granular matter concentrated and with hyaline endoplasm peripheral. The vacuole was not seen after the cell abandoned its symmetrical form and straightforward limacoid progression for the evolutions which preceded its rapid encystment. This non-production by an active amœboid cell of a vacuole for excretory purposes was probably due to cessation of metabolism and the approaching disintegration of the cell, the encystment or partial encystment of which is in many cases a premonitory symptom.

NOTES ON FORAMINIFERA AND OSTRACODA FOUND IN A SAMPLE OF SAND AT WILLIAMSTOWN BEACH.

(With Figures.)

BY F. CHAPMAN, A.L.S., Palæontologist, National Museum, Melbourne.

(*Read before the Field Naturalists' Club of Victoria, 12th April*, 1915.)

A SMALL quantity of sand, about a quarter of an ounce, was taken from tide-streaks on the occasion of the Club's excursion to Williamstown. The following notes were made on the material, and appear of sufficient interest, in view of future work in the groups of the microzoa.

FORAMINIFERA.

These are chiefly shells of diminutive size, probably on account of the proximity of magnesic-bearing rocks, the bluestone lava.

Nubecularia bradyi, Millett.—

This form usually occurs in much lower latitudes, generally in the neighbourhood of coral reefs. It is interesting to note in connection with this, however, that specimens of a reef-forming coral, *Plesiastræa*, can be frequently picked up on this beach.

Miliolina circularis, Bornemann, sp.—

A common form in nearly all shore sands, as at Altona Bay, Western Port, and Torquay. The present examples are quite small, as were those obtained from material dredged by the *Endeavour* off Cape Wiles, South Australia, at 100 fathoms. It is found fossil in the Victorian Tertiary strata.

Miliolina polygona, D'Orbigny, sp.—

One example. It is generally regarded as of fairly deep-water habit, as in the subantarctic dredgings off New Zealand, and from the east of Tasmania at 777 fathoms (*Endeavour*). It occurs as a Tertiary fossil at Grice's Creek.

Discorbina dimidiata, Parker and Jones.—

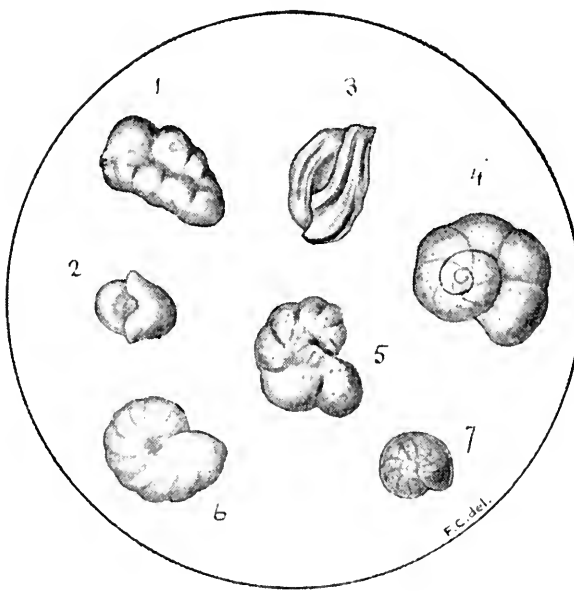
This little Discorbine is interesting from the fact that it seems practically restricted to the Australian seas. It is easily distinguished from the other forms of the genus by its prominent apical spire and the overlaps of the sutures with interspaces on the concave side of the test. It also occurred in Janjukian strata in the Mallee bores.

Polystomella crispa, Linné, sp.—

The tests of this species are very minute, quite the contrary to what one sees in examples gathered from a limestone-bound shore. It is a well-known component of shallow-water sands, and is occasionally found in deep water.

Polystomella macella, Fichtel and Moll, sp.—

One example. This form, and the preceding, range through the fossiliferous Mallee rocks.



FORAMINIFERA FROM SHORE-SAND, WILLIAMSTOWN.

Fig.
1.—*Nubecularia bradyi*, Millett.
2.—*Miliolina circularis*, Borneman, sp.
3.—*Miliolina polygona*, D'Orbigny, sp.
4.—*Discorbina dimidiata*, Parker and Jones (superior aspect).
5.—*Discorbina dimidiata*, Parker and Jones (inferior aspect of another specimen).
6.—*Polystomella macella*, Fichtel and Moll, sp.
7.—*Polystomella crispa*, Linné, sp.

OSTRACODA.

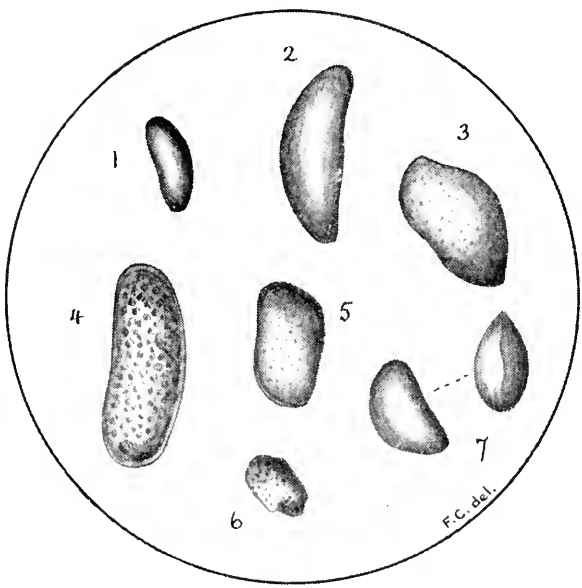
The sand from Williamstown, so far as the ostracodal fauna is concerned, gives great promise of interesting material to the worker in this group. The following notes will prove this, since they were based on the examination of a very small quantity of sand.

Aglaia (?), *cf. meridionalis*, G. S. Brady.—

This species was first described from the Falkland Islands, where it was found in anchor-mud from 6 fathoms. All other records are from tolerably deep water, down to 1,215 fathoms at Funafuti.

Macrocypris maculata, G. S. Brady.—

This species has a wide distribution, occurring in Bass Strait, round the Southern Ocean at Kerguelen Island, off South Africa, and in the West Indies. It is typical of moderately shallow water. *M. maculata* is distinguished from the common Australian form of the genus, *M. decora*, by its less arcuate carapace as seen from the side, and less pointed extremities.



OSTRACODA FROM SHORE-SAND, WILLIAMSTOWN.

Fig.
1.—(?) *Aglaia, cf. meridonalis*, G. S. Brady.
2.—*Macrocypris maculata*, G. S. B.
3.—*Bairdia amygdaloides*, G. S. B.
4.—*Cythere demissa*, G. S. B.
5.—*Cythere foveolata*, G. S. B.
6.—*Loxoconcha alata*, G. S. B.
7.—*Xestoleberis depressa*, G. O. Sars.

Bairdia amygdaloides, G. S. Brady.—

This specimen is a young form, and is less regularly ovate than in the adult. The *Challenger* examples came from Bass Strait (East Moncœur Island) and Port Jackson, amongst other localities. This species seems confined to the South Pacific and the Southern Ocean. It is a remarkable fact that *B. amygdaloides* was well established in the Southern Hemisphere in Miocene times, being found in the Janjukian of the Mallee, and there ranging into beds of later age.

Cythere demissa, G. S. Brady.—

A clean and typical carapace occurs in the Williamstown sand. It is found in the fossil state in the Lower Pliocene (Kalimnan) of the Mallee, and in recent dredgings is known from New Caledonia, the South Seas, and Port Jackson.

Cythere foveolata, G. S. Brady.—

The present example has very delicate foveolations, whilst in the typical form the pittings are strong The present variety, therefore, agrees with one which was dredged lately by the *Endeavour* off Tasmania at 777 fathoms. The species has also been found in a raised beach in the Antarctic, where the examples represent an intermediate form.

Loxoconcha alata, G. S. Brady.—

A beautifully ornamented left valve occurred in the sand. It differs from all the figured specimens of this species by having the surface-pittings directed towards the apex of the ventral beak. The previous localities for this species are Honolulu and Mauritius.

Xestoleberis depressa, G. O. Sars.—

This species is quite a common form in these sands. It is smaller and perhaps slightly more depressed than typical examples. It was previously obtained from Kerguelen Island by Dr. G. S. Brady (*Challenger*), and is a well-known form in the Northern Hemisphere, occurring round Great Britain, Ireland, Norway, Spitzbergen, and in the Gulf of St. Lawrence. It is also found in Post-Tertiary deposits in Scotland, Ireland, Norway, and Canada.

A VETERAN BOTANIST.—It is with regret that we record the death, on the 25th June, of Mr. F. Manson Bailey, F.L.S., of Brisbane, at the advanced age of 88 years. Mr. Bailey had filled the post of Colonial Botanist for Queensland from 1881 to within a short time of his death. His knowledge of the flora of Queensland was very wide, and this is well shown in the numerous works issued from time to time by the Queensland Government. His name will be commemorated for all time by the beautiful Cootamundra Wattle, *Acacia Baileyana*, now brightening our parks and gardens.

SAGACITY IN A CAT.—"I noticed an interesting instance of maternal affection the other day. Our cat, whose home is in the stable, some distance away from the house, came to the kitchen door carrying its kitten, which had its head fixed in a tin. The mother mewed and laid it down, and waited patiently until it was released, a work of time and difficulty."—(MISS) JESSIE HOOD, South Brisbane.

The Victorian Naturalist.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday, 12th July, 1915.

The president, Dr. C. S. Sutton, occupied the chair, and about 60 members and visitors were present.

CORRESPONDENCE.

From Mr. B. H. Whittle, Launceston, Tasmania, offering to exchange the chipped stones of the Tasmanian aborigines, native birds, animals, botanical specimens, &c., &c., for the polished stones of the mainland aboriginals.

A paragraph relative to Mr. Whittle's offer having appeared in the July issue of the *Naturalist*, no action was taken in the matter beyond drawing the attention of members to the proposal.

REPORT.

In the absence of the leader, Mr. T. S. Hall, M.A., D.Sc., Mr. F. G. A. Barnard made a brief report of the visit to the University Biological School on Saturday, 10th July. He said that there had been a good attendance, and though Dr. Hall had scarcely recovered from his recent severe illness, he had devoted the afternoon to an explanation of the methods adopted in training the students in biology, and had called attention to some of the more important specimens used as types or for demonstration purposes.

REMARKS ON EXHIBITS.

Remarks on exhibits were made by Messrs. Pitcher, Pescott, Gabriel, and Searle.

NEW SPECIES OF PTEROSTYLIS.

On behalf of the National Herbarium, Mr. P. Charman, lecturer on natural history at the Training College, made reference to a new species of orchid, of the "Greenhood" type, which was first found growing at Mentone in July, 1907, by Mr. J. R. Tovey, of the National Herbarium. Professor A. J. Ewart, at the time, suggested that it was probably a hybrid between *Pterostylis concinna* and *Pterostylis reflexa*, but asked Mr. Tovey to keep it under observation. It had appeared every year since then, and had kept true to its main characteristics. There were no orchids in the locality that had any intermediate stages between this species and either of the two mentioned. Its main distinction as a new species rested upon

the following chief characteristics:—(1) The labellum—longer than in either *P. concinna* or *P. reflexa*: and differing from *P. concinna* in being more pointed, and from *P. reflexa* in being bifid: (2) the arrangement of leaves on the stem—when first flowering the stem is short and the nodes show that the arrangement of leaves appears somewhat similar to that of a rosette, but the stem quickly elongates and the leaves are arranged alternately along the stem. He said work is still being done on this orchid, but, as it seems evident that it is undoubtedly a new species, Professor Ewart has decided to call it *Pterostylis Toreyana*, in honour of the finder. A full description of this species will be given in Professor Ewart's next "Contribution to the Flora of Australia," which will appear shortly in the *Proceedings of the Royal Society of Victoria*.

PAPERS READ.

1. By Messrs. E. E. Pescott, F.L.S., and C. French, jun., entitled "A Year Among the Orchids: a Reminiscence."

In a short, but interesting paper, the authors made reference to the fact that the season 1914–15, being an unusual one, owing to the drought, orchid life presented several interesting phases. Orchids were absent that were common in ordinary years, whilst certain hot and dry season orchids, notably *Lyperanthus nigricans*, were absent from certain localities. The outstanding feature of their observations on this interesting family during the season was the undoubted fact that, owing to the inevitable spread of cultivation, many of the species were doomed to extinction in the metropolitan area at no very distant date. The extension of fruit-growing in the country districts was likewise responsible for the disappearance of many species. Unlike other classes of plants, orchids do not readily lend themselves to cultivation, nor do they survive for any length of time on settled lands. The authors thus considered it a duty to study and record the result of their observations of a slowly but surely disappearing race of plants. The drought, contrary to the belief entertained by many, had no adverse effect on the abundance of orchids. Between Ringwood and Bayswater, during the month of October, twenty-two species and varieties were noted, while twelve were collected at Oakleigh, and eleven at Cheltenham. Out of 97 species recorded for Victoria, 62—or nearly two-thirds—were observed by them during the year.

The paper was illustrated by a series of lantern slides.

In complimenting the authors on their interesting paper, the president said that he had collected nearly all the Victorian species of orchids, and that for many years past it was obvious to him the chances of collecting many of the species dealt with that evening were becoming smaller and smaller every season.

Mr. G. Coghill said that the statement that he had exhibited *Pterostylis vittata* in May, 1884, as collected at Hawthorn must have been a slip, as Sandringham is the only locality in which he had collected it near Melbourne. Several species of orchids used to grow at Hawthorn, but they had long since disappeared.

Mr. F. G. A. Barnard referred to finding splendid specimens of *Gastrodia sesamoides* in a dark fern gully at Wilson's Promontory on the occasion of the Christmas, 1914, camp-out.

2. By Mr. L. G. Chandler, entitled "Some Victorian Birds and Their Haunts."

In explanation of a very interesting series of slides depicting the nests, eggs, and young of some of our native birds in their haunts, the author detailed the patience and tact that had to be displayed and the difficulties that had to be overcome before many of the views shown were secured. Many interesting narratives demonstrating the confiding nature of our birds when treated with kindness were narrated, and views expressed on several points whereon diversity of opinion among ornithologists exists. He mentioned that the Coach-whip-Bird, under certain conditions, will give utterance to the bi-syllabic call—which is usually given as an answering call by the female—in conjunction with his own whip-crack notes, and expressed the opinion that this is probably a ruse to protect the female from detection when danger threatens. Referring to the call of the Podargus, he stated that on one occasion he had heard this bird give a call which might easily be interpreted as "Mo-poke." At the same time the call could not be mistaken for that of the Boobook Owl, being uttered in a lower key, and much more rapidly. His conclusion was that neither bird said "Mo-poke." The call of the Boobook Owl resembled "More-pork," whilst that of the Podargus was more like "Rope-rope." Both species had a number of other distinct calls. An interesting point in connection with the Yellow Robin was mentioned—namely, that when the bird was perched on a gently swaying spray the body swayed in unison, but the head did not move. This enabled the bird to focus its eyes accurately on any particular spot. The author concluded his lecturette by reading some notes entitled "The Birds' Drinking Tin," in order to show the possibilities of bird photography out of the nesting season.

The president, in congratulating Mr. Chandler on the excellent series of views shown, intimated to the meeting that the lecturer was about to proceed to the front. He felt sure that all present would sincerely wish him a safe and speedy return, and that he might favour them on some future occasion with his other lantern slides, for the display of which there was not sufficient time that evening.

Mr. G. A. Keartland, in remarking on the excellence of the lantern slides shown and the interesting paper read, said he was in accord with the statement that the White-plumed Honeyeater was of a very pugnacious disposition, and instanced having seen these birds attack and follow a Winking Owl. He did not agree with the lecturer that the call of the Boobook Owl and that of the Podargus were similar. The Boobook, and the Boobook only, emitted the call "Mo-poke." He had seen the bird called up and shot whilst calling. The call of the Podargus was low, and might be likened to "Hoo-hoo."

Mr. Chandler, in reply, thanked the president and members of the Club for their expressions of appreciation at his efforts to interest them that evening, and for their hearty good wishes for his safe and speedy return from the front.

EXHIBITS.

By Miss Dines. — Various species of insects collected at Dummagudem, Upper Godaveri Valley, India.

By Professor Ewart.—New species of orchid, *Pterostylis Toveyana*, Ewart, from Mentone, Victoria.

By Mr. J. Gabriel.—Stem of *Tecoma M'Kenni*, 28 feet long, showing fasciation.

By Messrs. E. E. Pescott, F.L.S., and C. French, jun. — Growing specimens of orchids, *Pterostylis nutans*, R. Br., *P. nutans*, R. Br. (albino form), *Cyrtostylis reniformis*, R. Br.; also flowers of *Pterostylis vittata*, Lind., *P. obtusa*, R. Br., and *Corysanthes pruinosa*, A. Cunn; and twenty-three lantern slides in illustration of their paper.

By Mr. F. Pitcher, on behalf of the Curator of the Botanic Gardens.—Flowering specimens of *Acacia aspera*, Lind., Rough-leaved Acacia, *Acacia cardiophylla*, A. Cunn., Wyalong Wattle, *Acacia decurrens*, var. *normalis*, Benth., Sydney Black Wattle, and *Acacia spectabilis*, A. Cunn., Showy or Mudgee Acacia.

By Mr. J. Wisewould. — Flowering plant of *Epacris impressa*, Labill., 6 feet 9 inches in height, from the Pakenham district.

By Mr. J. Searle.—Living Hydroid, *Cordylophora Whiteleggii*, from lake, Botanic Gardens, Melbourne.

After the usual conversazione the meeting terminated.

AUSTRALIAN WILD-FLOWERS.—Messrs. W. and H. Wills, tobacco manufacturers, of Sydney, have issued a series of fifty cigarette cards, bearing coloured illustrations, with names and descriptions, of Australian wild-flowers, many of which are excellent, considering the small scale on which they are executed.

SOME SOUTH AFRICAN SCENES AND FLOWERS.

By (Miss) Amy V. Fuller.

(*Read before the Field Naturalists' Club of Victoria, 14th June,* 1915.)

To attempt to interest a company so much more learned than myself seems great presumption on my part, for I know but little of the science of botany. It was only my love of flowers that prompted me to find a way to preserve the memory of the thousands of native flowers that came under my notice whilst I was living in Cape Town with my relatives.

For the first few weeks I tried to press all the different varieties I came across, but this was not at all satisfactory, as so many of them were succulent, such as the Mesembryanthemums, Lachenalias, Rocheas, water-lilies, &c., and others were too solid, such as the Proteas, Leucospermums, Leucadendrons, &c., so that I determined to try and paint them. I had had a few drawing lessons at school, which now stood me in good stead. Of course, I began by attempting only the easiest flowers, but became so enthusiastic that before long I tried anything and everything. Some are, of course, not as successful as others, but I will show them to you, just as I sketched them originally.

I have painted about 325 South African specimens, which the late Prof. MacOwen named for me, also 165 Western Australian flowers, which were named by the late Dr. Morrison, and have recently started on some Victorian and New South Wales varieties, which my friends at the Melbourne Botanic Gardens and Mr. J. H. Maiden, of Sydney, respectively, have kindly identified for me.

During a recent visit to London, the authorities at the Royal Gardens at Kew wished to purchase part of my collection for their herbarium, choosing the flowers that were most uncommon, and of which they had no representations other than pressed specimens, and it was with a heavy heart that I parted with the 102 sheets which they selected, as my flowers have always been very dear to me. Among those that I still retain you will probably find only a few that are not more or less familiar in a cultivated state, for naturally those purchased by Kew were the most rare—chiefly Rhodesian, together with some of my Western Australian specimens.

What struck me so much in South Africa was that there was scarcely any time of the year when I could find no flowers to paint, so to-night I purpose showing the flowers according to their flowering month, instead of arranging them in their orders and species. I dated most of my specimens at the time of putting them on paper, so will start with January, as being the first month in the year, and show you what I have to

represent each month as it comes. Naturally, in the spring and early summer the flowers were most numerous, and sometimes it meant starting work at 6 a.m. and continuing at high pressure as long as the specimens lasted fresh enough.

Table Mountain is a wonderful field for naturalists, but on my first visit to South Africa, in 1893, which lasted about eighteen months, the flowers were much more plentiful than when on my fourth visit, which was last year; in fact, the Government has found it necessary to protect the Table Mountain flora for some years to come—a proof that they were being by degrees destroyed. The coloured people still sell the wild-flowers in the streets on Saturdays and Wednesdays in Cape Town, and take up their stand in Adderley-street for a stretch of about two hundred yards; but they have to go some distance to gather the flowers, now that there are restrictions and so many varieties and localities preserved.

There is no doubt that the Cape peninsula is a rich hunting-ground for the botanist, for there are endless hills and mountains wherever one travels, and each spot seems to possess its own special varieties. Such as Caledon heaths are found nowhere else, Riversdale heaths are again distinct, and so on. Fransch Hoek has a variety of Serruria (*florida*) and Ericas that grow on one special hill, and only the experienced botanist has any hope of finding them. One ought to be very grateful to the early Dutch settlers, who planted avenues of oak trees in and around Cape Town, for they are now quite a feature of the town, and form welcome shade with their beautiful spreading branches. Unfortunately, the late Cecil Rhodes introduced the little grey squirrel from England into his own grounds, and they have now become so numerous around Cape Town that in the early spring the avenues are carpeted with the young green leaves nibbled off by the squirrels. The forests of pine trees make a happy home for them when the oak trees are bare. The Cape Forestry Department is planting pine forests on the slopes of Table Mountain, which form dark patches when seen from a distance, but there seems to be rather a difference of opinion as to the wisdom of this extensive planting, as it is destroying so much of the undergrowth and natural beauty of the grand old mountain.

On my recent visit I was amazed to see how very general was the use of the Coast Tea-tree, *Leptospermum lævigatum*, for garden hedges, and how beautiful was the result, even up to six and eight feet high—straight, square walls. An Australian wattle—I think the Golden Wattle, *Acacia pycnantha*, though commonly known in South Africa as Port Jackson Willow—and the Leptospermum I have just mentioned have become so abundant round about the Cape Town flats (having

been used freely as breakwinds), that one would scarcely believe that they were not indigenous to that country. From Table Mountain slopes the flats below appear one yellow mass in wattle time, and may be seen extending for several miles. The private gardens around Cape Town are, on the whole, very poor, as everyone seems to prefer the native flowers; and when they are so plentiful for sale in the streets, and women frequently going from house to house with a tub of flowers on their heads selling bunches at a "ticky" (3d.) apiece, you have no difficulty in obtaining as many as you want. Even along the coast one finds flowers almost to the water's edge. It would take a lifetime to try and paint all the varieties. There are about 450 varieties of Ericas alone, and unless one can see them for oneself it is impossible to imagine the profusion. Western Australia is rich in flowers, but to my mind has nothing like the wealth of the Cape peninsula.

After leaving Cape Town for the north you pass through miles and miles of flowers. Vlejs or swamps of blue Nympheas, and pink and white water-reeds, Proteas, Ixias, Gladiolus, Watsonias, &c.; and the familiar Arum Lily is constantly in evidence, commonly known by the Cape people as the pig lily—I suppose because the pigs grub the roots. For many miles the colours are constantly changing, and one longs to get out of the train to gather specimens. But after the Hex River Mountains are passed the country changes into something of a desert—well known as the Karroo; but even here, in the spring, there is a carpet of flowers of the Mesembryanthemum type, with salt-bush, &c. For many weary miles there is very little change after this, and only an occasional tree, chiefly a willow or blue gum that some enterprising farmer has planted on his farm, is the only growth more than a foot or so high. The kopjes are nearly all stony and barren looking for the greater part of the year, though at times in some places everything is fairly green. The Cape Mimosa, with its long, thorny spines, is one of the brightest bushes in its season, with its large, yellow, wattle-like balls, especially round about Kimberley, where there is so little growth of any kind.

From Kimberley to Mafeking the country gets more interesting again. At every stop there are many natives to greet the train, offering their curious wares for sale to the passengers; they are picturesque figures, with little more covering than a skimpy waist garment made of native muslin, called limbo, and not infrequently a turban of the same material on their heads—originally, probably, in bright colours, but mellowed and rendered far more artistic by the prevailing reddish dust. Men, women, and children greet the passengers with a volley of chatter, all speaking at once and offering their goods in

broken English—karosses, skins, and, what fascinated me more than anything, their queer animals carved out of wood. They are so clever in getting the form and general character of the animals that one can at once recognize the buffalo, the baboon, tiger, elephant, giraffe, guinea-fowl, ibis, and bison, each out of a single piece of wood, stained or burnt : but the most clever part of it is that they do it all with their hatchets, I am told, and have no knives or finer tools to make the details. Tortoise-shells, wire-work baskets, bangles, and ornaments, and even bundles of orchid roots, are also among their wares, most articles ranging from a "ticky" to a "shelling," as they call a shilling.

After three nights and as many days in the train, and skirting the Kalliharé Desert, the country changes considerably, and one passes through miles of mopani or fever trees—a species of Bauhinia, I think. The first time I went to Rhodesia it was in August, and I stayed in Bulawayo for nine months, and as we passed through the mopani forest it looked like a large orchard in full autumn tints, the trees being just about the size of a well-grown apricot tree ; but last time I passed through it was in January, and the trees were a vivid green and fresh looking, in spite of the great heat.

After leaving Buluwayo, which is now a township of 7,000 white inhabitants, one changes into a smaller but distinctly comfortable train, well fitted up to suit the conditions of the country—gauze netting over windows and ventilators, to make the compartments as mosquito-proof as possible, as it is, I believe, an acknowledged fact that the black and white striped mosquito is the instrument that spreads malarial fever by its bite. Quinine tablets are administered free of charge by the railway company to any visitors desiring them as a preventive. I might add that the Cape Town train has a shower bath at each end of a first saloon car, as well as a nickel wash-basin and plentiful supply of water in each compartment—greatly appreciated luxuries on that long, hot, and exceedingly dusty journey. About 8.30 p.m. we reached Melindi, a little wayside station where the engine takes water, and we were able to visit the spot, close alongside the line, where the skull of an elephant is mounted on a pedestal, and were told that it was here that the huge beast crossed the railway just three years before, and came in contact with the mail train, derailing the engine and causing its own death. The head was that of an enormous animal. We were told that we might see a giraffe or zebra from the train as we passed through that locality, but we were not fortunate enough, although we scanned the forest growth on either side until it became too dark. The vegetation began to get more tropical as darkness came on, and the morning

showed us masses of white, sweet-scented bauhinias, all wet with rain that had fallen in the night, as well as many other less striking flowers, all along the railway. The joy of being in a new country, with surprises in the way of flowers at every turn, can never be described or imagined; everyone has their own sensations in such experiences. It was shortly after 7 a.m. when we reached the Victoria Falls station, but long before that the white spray of the falls could be seen in the distance, looking like white smoke of some huge bush-fire; and we knew then that we had really arrived at the wonderful and majestic falls of Zambesi that Livingstone had discovered about 50 years before. When you see their grandeur you can in a measure realize the feelings of the great explorer when they first burst on his view and he heard the roar of their mighty waters.

There is no town of Victoria Falls, the nearest village being that of Livingstone, seven miles further up the line; but behind the station there is the hotel, run by the Railway Department, and a few thatched kraals belonging to the curio traders, and, scattered about, one comes upon a few native huts from time to time. Instead of leaving the train at the Falls station, we handed our baggage over to the hotel servants and went on to the next station, which is Palm Grove, crossing the wonderful bridge, on which there is a toll of one shilling.

Early morning, everything wet with night showers, and a tropical feeling in the air, was what greeted us when we left the railway siding, and we wandered beside the mighty Zambesi simply entranced. It seemed like fairyland, so fresh and green, palms and tropical trees and flowers, papyrus, &c., on all sides. With the first view of the falls and their surroundings our hearts were too full for comment. We could simply gaze in speechless amazement. The first few moments of that sight can never be imagined. We stood breathless and speechless, overawed by its marvellous greatness — rainbows here and there in the foaming mist as it rose from the mighty abyss. It was a revelation to me. We wandered along the banks of the river above the falls, on and on, in the early morning, before the sun had gained its full power. The ibis and dicas were having their morning plunge and searching for food. We kept our eyes open for hippopotami and crocodiles, but were not fortunate enough to see any that morning. We crept along what is called the "Knife Edge"—a narrow, scimitar-shaped tongue of land jutting out into the tremendous chasm, so that as we got to the point, knee-deep in wet grass, we had the tearing torrent on either side, and, far below us, the boiling pot, where the river in its deadly haste whirls itself round and round, as if it were boiling furiously, and sending its steam-

like spray hundreds of feet into the air. One could spend many days, always seeing fresh sights, in that wonderful world of water, and each day we set off in another direction to see what further charms still lay before us. A walk to Danger Point in the moonlight, to see the lunar rainbow—unpaintable, indescribable in its mysterious beauty—was not easily forgotten.

The next day we were to visit Livingstone Island, named, of course, after the great explorer, David Livingstone, who carved his initials, "D.L.," in deep-cut letters on a large tree on the island. We were paddled across the river in and out of quite a fairyland of islands, where gorgeous butterflies flitted about in great numbers, the Canadian canoe and native oarsmen adding to the charm and novelty of it all. The vegetation on the island is very dense, and the Jequiritz, or Prayer-bead Climber, *Abrus precatorius*, is climbing over many of the trees, so that the fierce rays of the sun never reached us as we wandered from one view of the falls to another. My enthusiasm was unbounded when I came across a patch of buttercup-yellow gladiolus, growing about four feet high, and quantities of crimson and gold tiger-lilies—*Gloriosa speciosa* I think they are called—supporting themselves up the trees with their tendrilled leaves, and many other flowers that were quite new to me.

I was very loth to leave that lovely island, and should have been quite happy to have wandered about it in solitude, taking in all the details, that to me mean so much. I did long for someone who could tell me something about the interesting things around, but we had to return to the canoe and make for the mainland once more, where the natives were to meet us with the luncheon hampers. Back again on the banks of the river, we found our way down and down along a winding path among the palms and tropical creepers to the water's edge below the falls—on to the rocks beside the boiling pot, which we had seen not long before from Livingstone Island, many hundreds of feet above. It is wonderful how the little fresh-water crabs of three or four inches across manage to scramble over the rocks at the edge of the river in spite of the rushing water.

The next day we found our way to the river again. It was by far the coolest place, and one could almost forget the day was so hot beside that expanse of water. This time we went to the opposite bank, above the falls, and there found we could walk along the water's edge, among the palms and trees, for several miles in the shade, and there, in a cool spot, we had our lunch, which the natives had again brought us. Along here we saw one of the largest of the baobab trees in the district, with its large hibiscus-shaped flowers, now almost over, and the long cucumber-like fruits forming instead; some

of these must have been quite 1½ feet long, fleshy and green, and seeded very like a marrow or cucumber. I have never seen so many varieties of beautiful trees before, mostly compound leaves, after the style of an acacia or rose, varying in form and size. My want of botanical knowledge was a continuous regret to me, for there was no one with me in the least interested in the flora.

The next day we made an early start for Kandahar Island, so called after Lord Roberts by Lord Kitchener. The island is very like the others that are studded about that part of the river, but the delight was the getting there, which meant about eight or ten miles, reclining at the bottom of a canoe, and being paddled up-stream by four natives. The regular swing of their stroke as they prodded the water quite harmonized with the dreamy atmosphere, gorgeous butterflies still hovering over us even in mid-stream. After lunching on Kandahar Island we again boarded our canoe, and later on landed on a charming little island called Kyli Island. Here the vegetable ivory palm grows in abundance, and I also saw a very pretty pale salmon-pink hibiscus. As I had expressed a wish for some of the ivory palm fruit, I was soon quite inundated with them from all the four natives, who knock them down very cleverly from the high palms by throwing old fruits or sticks at them, bringing down one or two with each throw. The fruit is rather like a miniature cocoanut, only they grow like giant bunches of grapes, and inside several coverings of each fruit is the ivory ball, about half the size of a billiard ball.

It was on this island, while I was making an attempt to capture some of the lovely butterflies with an improvised net, that I was startled by a huge iguana, about five feet long, coming down a tree close in front of me. It had a bright yellow waistcoat, and looked really formidable as it came scurrying towards me, more terrified, no doubt, than I, as it scrambled down the slope at the root of the tree and away to my left. It was certainly the largest I had ever seen, though they told me at the hotel that five feet was quite the average size; but for the moment my mind flew to the crocodiles that I knew were so numerous in the river close by. It took me some moments to recover from its sudden intrusion. Once more in our canoe, after the natives had again regaled us with afternoon tea, we glided down-stream with the tide, and made for the boat-shed. It was much cooler, and we were thoroughly enjoying the lazy motion of the boat, when I noticed that the two front Zambesi boys were excited about something, and I caught the word "Hippos," and there, to our right, not far ahead, were three huge hippopotami disporting themselves in the river, opening their enormous, ugly mouths, and

seeming to spout the water through their nostrils, snorting and splashing in the water. They were uncomfortably close, and our oarsmen paddled vigorously to get out of their way, as there have been some serious accidents through these beasts upsetting the boats on the river. There are too many crocodiles to make a ducking pleasant. As soon as we landed we made haste to tell our friends, who, we knew, were anxious to see them too. We met them at the entrance of the "rain forest" for which we were bound, and they hurried along the way we had come.

When the sun is getting low, the rain forest is unique, for it is then that there are three rainbows to be seen, the minor two being complete circles. One must be suitably clad for the rain forest, as a drenching rain blows at all angles and soon saturates you through and through. It is always wet there, for it is in reality the spray scattered by the falling torrents; and, although everywhere else the heat may be very great, in the rain forest it is always cooler, though wet and steamy. On the edge of the forest, overlooking the abyss, it is very rocky, like a sea-coast at low tide, the rocks being covered with what looks like very soft bronze moss; but I found to my cost that it was too slippery to walk on. There, too, the little crabs scrambled about in great numbers. From the edge of that precipice—which I did not reach, however—one can be encircled by the rainbows. The undergrowth in the forest is rank and green, maiden-hair and other ferns carpeting the ground, with lovely moss covering the stones and fallen trees. The various buck and other animals are more plentiful here than in other parts. From the inner edge of the rain forest the best general view of the main falls is to be seen, as well as Cataract Island, where fishing is a favourite as well as profitable pastime for those who like it.

The days simply flew past—there seemed so much still to see; but it was a week of perfect enjoyment, except for the great heat, the entrance hall and rooms at the hotel registering 106° most of the time; nevertheless, it was with great reluctance that we again took our places in the train on our return journey to Cape Town. I might say here that a young puff adder was caught in the hall at the hotel, and one of the men killed it and was able to show and explain to us its interesting methods of using its poison, &c.

We left Victoria Falls station one Saturday morning at 12.15, and arrived at Cape Town on Thursday at 11 a.m., in time to enjoy our lunch on *terra firma* instead of in a train rocking and swaying from side to side as it hurried over the 1,662 miles of country that stretch between Cape Town and the great Zambesi Falls.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday evening, 9th August, 1915.

The president, Dr. C. S. Sutton, occupied the chair, and about 40 members and visitors were present.

REPORT.

A report of the visit to the Economic Museum, Melbourne Botanic Gardens, on Saturday, 24th July, was given by the leader, Mr. F. Pitcher, who stated that about a dozen members were present. Considerable interest was evidenced in the examination of the fine specimens of Australian and exotic timbers, carpological collection, gums, resins, fruits, &c. Interesting particulars respecting some of the more noteworthy exhibits were given, and the methods adopted in preserving, pressing, and mounting specimens were briefly outlined. A ramble along the Australian border was then taken, and half an hour or so devoted to the classification shed, thus making a profitable and enjoyable afternoon.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. Charles Daley, Clarinda-street, Caulfield, and Mr. John Dow, 9 Ford-street, Brunswick, were duly elected as ordinary members of the Club.

PAPERS READ.

1. By Messrs. J. Shephard and J. Searle, entitled "A Trip to the Colac and Camperdown Lakes."

The authors pleasantly described the incidents of a brief collecting trip in June last to the lakes in the neighbourhood of Camperdown and Colac, made for the sake of investigating their microscopic fauna and flora. A striking illustration of the severity of the drought just terminated, and through which the State has passed with such disastrous consequences to the pastoralist and his flocks, was evidenced by the condition of Lake Colac (which has an area of about ten square miles), and which was more than six feet below its normal level. The use of a tow net revealed the fact that the waters of the lake teemed with various species of Cladocera, Ostracoda, Copepoda, Rotifera, and other small forms of life. Lakes Gnotuk and Bullen-Merri, near Camperdown, were next visited. The shores of the former were found to be covered in parts with the small shells of *Cociella striatula*, but its waters were not very prolific in microfauna. From Bullen-Merri large numbers of two species of rotifers of the genus Brachionus and a copepod

of the genus Eurytemora were secured. Operations at Lake Corangamite, though conducted under adverse weather conditions, resulted in the discovery of a copepod which may prove to be the type of a new genus. The Brine Shrimp, *Paratemia zietziana*, was noted in immense numbers in parts of the lake. The authors advocated a systematic investigation of the microfauna of the lakes of the Western District, and expressed the belief that such would reveal many rare and interesting forms of life.

Mr. A. D. Hardy, F.L.S., favoured the suggestion of Messrs. Shephard and Searle, and suggested that the Club should arrange a "camp-out" near the lakes for those interested in the class of study under discussion.

The president, Dr. C. S. Sutton, and Mr. F. G. A. Barnard took part in the discussion, the latter referring to the weirdness of the adjacent Stony Rises, adding that, in a favourable season, their botany would doubtless prove interesting.

2. By Mr. R. A. Keble, entitled "Picric Acid and Grass-tree Gum."

In a short and somewhat technical paper the author pointed out that in the gummy exudation of the Xanthorrhœas, or grass-trees, Australia possesses a large and practically untouched reserve of a commodity which, with a little scientific treatment, yields picric acid, one of the principal ingredients employed in the manufacture of the various high explosive compounds so extensively used with such appalling effect by the European powers in the present war. The fairly high percentage of picric acid yielded by the gum, or resin, of the grass-tree was apparently known to the scientific and commercial men of other nations, since a number of companies had been formed prior to the war to gather and export the resin, but whether it was utilized for industrial purposes, or devoted to less peaceful ones, appeared problematical.

The president said that over eight years ago Robert Kaleski fully described the Xanthorrhœa and its products in the *Bookfellow*. The resin was then worth £10 per ton, and in collecting it a man could readily earn 10s. or 12s. per day without much exertion.

Messrs. Pitcher, Hardy, Searle, and Barnard contributed to a short discussion which followed.

NATURAL HISTORY NOTE.

An Abnormal Limb in a Copepod. Mr. J. Searle said that the finding of abnormal structures in species of the fresh-water Copepoda is so extremely rare that such an occurrence is worthy of note. Just now the copepod *Boeckella symmetrica*, G. O. Sars, is extremely abundant in the Botanic Gardens lake. It is a strongly-marked species, and easy of identification,

Recently, while examining some material collected from the lake, he found a male specimen of the species referred to which, in addition to the spine always found on the outside of the apical claw of the left leg, near its base, had another spine on the inside of the same claw, and nearer the base than the normal outside one. This was only the second occasion on which he had found an abnormal structure in a fresh-water copepod.

The specimen was exhibited under the microscope, a drawing of a normal limb being shown for comparison.

REMARKS ON EXHIBITS.

Mr. F. G. A. Barnard, referring to his exhibit of a growing plant of the fern *Botrychium ternatum*, Swartz, Meadow Moonwort, said that the plant was collected during a Club excursion some twenty-five years ago. It was an annual plant, which usually sent up but two fronds each season—a fertile and an infertile one—and if either of these happened to be destroyed it was not replaced. This year the two fronds were eaten off by slugs soon after they appeared, and he naturally expected that the plant would remain frondless till next spring, as had happened before, but this year it had produced a third (infertile) frond. He considered the species an interesting one, and worthy of cultivation. Though distributed all over the world, it seemed to be nowhere plentiful. The specimen under notice was collected in the Oakleigh district.

Mr. F. Pitcher, in drawing attention to the exhibit of acacia blooms from the Botanic Gardens, mentioned that the specimen shown that evening as *Acacia fimbriata*, A. Cunn., had been for many years wrongly labelled in the Gardens as *A. prominens*.

Mr. J. Searle, in referring to his exhibit of specimens of sea-pens, collected at Western Port, gave some account of the life-history and method of growth of this group of animal life. He said that the family Pennatulidæ contains some of the most beautiful of fixed marine animals. The sea-pens are colonies of little polyps, differing from the coral polyps, to which they are related, in that, instead of secreting calcareous tubes in which to dwell, they are supported by a limy central rod, which is covered with a fleshy cœnosarc; this branches out in a number of pinnæ, along which the polyps grow. They are brilliantly coloured, and some are very luminescent. They live fixed on the bed of the sea, the stalk-shaped portion lifting the polyp-bearing part above the sea bottom. The primary polyp is developed from a fertilized egg, and forms the main axis on which the secondary polyps are carried; these, in turn, by means of stolons, give rise to tertiary polyps, and so the colony grows.

EXHIBITS.

By Mr. F. G. A. Barnard.—Pot-grown specimen of fern, *Botrychium ternatum*, Swartz, Meadow Moonwort, collected at Oakleigh some twenty-five years ago.

By Mr. J. Gabriel.—Polyzoa from Western Port Bay, including *Amphiblestrum cervicornis*, *Aetea dilatata*, *Cryptozoon wilsoni*, *Densipora corrugata*, *Dimetopia spicata*, *Euthyris episcopalis*, *Hornera foliacea*, *Lichenopora wilsoni*, and *Membranipora serrata*.

By Mr. C. J. Gabriel.—Marine shells from Western Port Bay, including *Chlamys acklinos*, Petterd, *Cyclospecta fawus*, Hedley, *Thracia modesta*, Angas, *Dosinia victoriæ*, Gatliff and Gabriel, *Lutraria rhynchæna*, Rve., *Eugyrina subdistortum*, Lam. (with egg capsules), *Acanthochites exilis*, Torr and Ashby, *Ischnochiton falcatus*, Hull, *I. gabrieli*, Hull, and *Loricella angasi*, Ad. and Ang.

By Mr. R. A. Keble.—Gum or resin from the Southern Grass-tree, *Xanthorrhœa australis*, R. Br.

By Mr. F. Pitcher, on behalf of the Curator of the Botanic Gardens.—Blooms of twelve species of Australian acacia—viz., *A. acinacea*, Lindley, Gold-dust Acacia, V., N.S.W., S.A.; *A. armata*, R. Br., Kangaroo Thorn, V., N.S.W., Q., S.A., W.A.; *A. cultriformis*, A. Cunn., Knife-leaved Acacia, N.S.W., Q.; *A. decora*, Rich, Graceful Wattle, N.S.W., Q.; *A. fimbriata*, A. Cunn., Fringed Acacia, N.S.W., Q.; *A. longifolia*, var. *sophoræ*, F. v. M., Spreading Coast Wattle, V., N.S.W., Q., S.A., Tas.; *A. montana*, Benth., Mountain Wattle, V., N.S.W., S.A.; *A. neriifolia*, A. Cunn., Oleander-leaved Acacia, N.S.W., Q.; *A. pravissima*, F. v. M., Ovens Wattle, N.S.W.; *A. strigosa*, Link., Hairy Acacia, W.A.; *A. verniciflua*, A. Cunn., Varnish Wattle, V., N.S.W., S.A., Tas.; and *A. vestita*, Edwards, Clothed Acacia, V., N.S.W.

By Mr. D. J. Paton.—Collection of wild-flowers from Bendigo, including *Boronia polygalifolia*, *Eriostemon oborvalis*, *Acacia aspera*, *A. calamifolia*, *A. diffusa*, *A. pycnantha*, *A. sclerophylla*, *Marianthus procumbens*, *Hakea acicularis*, *Grevillea ilicifolia*, *Hovea heterophylla*, and *Diuris maculata*.

By Mr. C. L. Plumridge.—Pot-grown specimen of *Epacris longiflora*, in bloom, from Blue Mountains, New South Wales.

By Mr. J. Searle.—Collection of marine objects from Western Port Bay, including polyzoa, gorgonia, pennatulidæ, sponges, ascidians, star-fish, mollusca, crustacea, pipe-fish, calcareous algæ, &c.

By Mr. F. Wisewould.—Blooms of six species of acacias from Upper Pakenham—viz., *A. dealbata*, *A. diffusa*, *A. linearis*, *A. melanoxylon*, *A. myrtifolia*, and *A. pycnantha*.

After the usual conversazione the meeting terminated.

THE FORESTS OF VICTORIA.

PART I.

BY A. D. HARDY, F.L.S.

(*Read before the Field Naturalists' Club of Victoria, 10th May, 1915.*)

I.—HISTORICAL REFERENCE.

BEFORE proceeding to discuss the existing forests, let us briefly review the history of Victoria in so far as it bears on our present subject. Although the geographical history of this part of Australia may be said to have begun after coastal voyages by Commander Grant and by Dr. Bass, and the discovery of Port Phillip Bay by Lieut. Murray in 1801, an increase of population such as promised exploitation of the natural resources of the new land did not begin until the discovery of gold, in 1851. With this increase there grew a demand for timber for dwellings to replace the "canvas town" settlements of Ballarat, Bendigo, &c., and a further demand for the construction of fences, culverts, bridges, jetties, wharves, and telegraph lines—a demand that persisted and increased. The earlier settlers destroyed valuable timber much in excess of their actual requirements for direct economic use; but, however deplorable that fact may be, it is none the less true that much of the wholesale slaughter was inevitable and even necessary if the pioneers were to successfully combat the allied forces of nature, and master the wilderness.

At the outset they had the materials for their primitive dwellings ready to hand. Arboreous vegetation there was of a sort, but of poor timber value, the dearth of timber trees being a recurring note in the diaries of the surveyors of Port Phillip Bay and environment of the new settlement. For their "wattle-and-daub" huts there was an abundance of lithe, tough stems and branches of acacias and other shrubs*—*Acacia pycnantha* on the higher Silurian and its sandy, gravelly capping, which bore also much *A. mollissima*; and along the streams grew *A. dealbata*, of which hardly a representative vestige remains close to Melbourne. These were in those days known better as Mimosa (whence the corruption "Prickly Moses" for *A. verticillata*). The Red Stringy-bark Gum, *Eucalyptus macrorrhyncha*, furnished the slabs of bark which roofed and walled and even chimneyed their bark huts, a type of dwelling which persists in wayback parts remote from railways and wheel-tracks. In 1853 the Castlemaine Mechanics' Institute was in a bark hut. For their post and

* "Wattle" is not a term of Austral origin, and applies to any flexible stems or twigs capable of being woven or laced together, as in the mud houses of Anglo-Saxons, West Africans, and others; and many acacias, because of this early use, have been called wattle.

rail fences and slab huts the fissile wood of the same species, and the tougher wood of the lowland form of *E. viminalis*, and probably that of *E. rubida*, supplied abundant material. The colloquial "logs" is a term almost forgotten, but was appropriate in the days when the prisons were made of young tree-trunks laid horizontally.

The ever-increasing demand for firewood soon made itself evident in the disappearance of the stunted forest of eucalyptus close at hand, chiefly *E. viminalis*, *E. rostrata*, *E. paludosa*, and *E. melliodora*, and, later, those further afield, such as *E. elæophora*, *E. obliqua*, *Banksia marginata*, *B. integrifolia*, *Exocarpus cupressiformis*, *Casuarina stricta*, and *C. suberosa*. Long before the clay beds were opened up, the lava which filled the old Yarra Valley was drawn upon for the easily-obtained basalt (bluestone) for more substantial dwellings, and examples of this type are still to be found about Melbourne. But wattle-and-daub, slabs and bark, and bluestone were only of temporary efficiency, so the exploitation of the clay beds and of the highland forests almost simultaneously began to cope with the growth of a city which, in half a century or thereabout, reached a population of half a million, and an area of about 145 square miles, to say nothing of the growth of such provincial cities as Geelong, Ballarat, and Bendigo. The first pier (at Williamstown) was a rough stone structure, boulders from the decomposing lava surface being used, as more readily obtained than timber.

The mention of piers leads us to remember the speculation as to the identity of old wrecks scattered along the Victorian coast and the Strait islands, which gave rise to the idea that richly-freighted vessels from the Spanish main were still awaiting salvage. The timber of such as I have examined, however, looked suspiciously like Australian hardwood, and compared most nearly with *Eucalyptus obliqua* and *Eucalyptus globulus*. Of the 40 ships trading between New Zealand and America in 1853, in sealing and whaling products, &c., and comprising French, British, and American, 20 were of New World origin, and averaged 333 tons; and so various mahoganies, ash, &c., may have been found about the coast. Small vessels were built in Tasmania, probably of Huon pine, *Dacrydium Franklinii*, or Blue Gum, *Eucalyptus globulus*, for cross-Strait trade, and it is recorded that prior to 1846 a small vessel named the *Tazer* was built on the Yarra. She was a 40-ton vessel, and was made of the River Red Gum, *Eucalyptus rostrata*.

With the extension of railways, the building of piers and bridges, the growth of the telegraph system, and the need of abundant prop timber for the mines and slabs for retaining

walls, the demand for some kind of forest control became more insistent; but nearly half a century of devastation passed before the people placed this priceless heritage in the keeping of a department—a department whose undivided attention was to be devoted to the conservation of the forest wealth.

Prior to 1907 forest control was thought to be sufficiently assured by administration by one of many branches of a department, and, like a shuttlecock, it was tossed about—from Lands to Mines, from Mines to Agriculture—each of these having had a turn as foster-mother. The expert officers had limited control and restricted initiative. The following reference to the usages of the Lands Department of many years ago will suffice to show how black was the outlook for the future of forestry, in view of the antagonistic interests existing within a department administering both forestry and land settlement:—Settlers were required to effect, in the first stage of their tenures, improvements to the value of ten shillings per acre before acquiring better tenures and finally the Crown grant. "Improvements" frequently comprised the following:—Dwelling (often a log and bark or slab and bark hut), a little cultivation, fencing, ringbarking, and clearing. The chock-and-log fences were composed of some of the finest prop and pole and spar timber, and when axe and fire had played their part some of the finest milling timber was in places hauled into line by bullock teams to form log fences, and, later, magnificent cover for rabbits. The ringing of the timber was not only allowed, but was at times necessary to obtain grazing. In recent years the Lands Department made provision for the planting of trees by new selectors in the north-west part of the State.

In 1897 a Royal Commission was appointed, and, after much travel in this and other countries, presented a comprehensive fourteenth report in 1901. But it was not till 1907 that a *Forests Act* was passed and a Department of State Forests created, with a Minister and Conservator, with great powers of control and initiative. Consequently, in January, 1908, there began a new era in the history of Victorian forestry.

II.—Area and Nature of Reserves.

The more or less permanently reserved forest area is about 4,000,000 acres—a fourteenth part, or 7 per cent. of the total area of the State. The remaining woodland area is alienable, and amounts to nearly twice as much as the lands reserved under the *Forests Act*. But the total woodland area of *timber* value is, perhaps, not much more than 7,000,000 acres.

The following are the various kinds of reserve: 1. *Forest*

Act reservations, which cannot be reduced in area excepting by consent of both Houses of the Legislature: these reserves include forests which produce the best milling timber, in localities such as Baw Baw, Dandenong, Otway, Yarra, Rubicon, Tambo, Mount Cole, Gunbower, and comprising species including *Eucalyptus globulus*, *E. regnans*, *E. goniocalyx*, *E. obliqua*, *E. Muelleriana*, *E. rostrata*, *E. tereticornis*, *E. Sieberiana*, and *E. Delegatensis*, and also the box and ironbark areas of the Northern districts. 2. *Land Act* reservations, of diminishing area, and revocable by order of the Governor in Council. 3. Areas departmentally withheld from settlement pending the removal of the standing timber.

In addition to the specific reservations, the whole of the unoccupied Crown lands throughout the State, with a few exceptions, and including those areas held under annual grazing licence, and the remnants of grazing leases from which selections have been made, have been proclaimed by *Gazette* notice as "protected forest," and as such, as far as control of the timber is concerned, are under the care of the State Forests Department. Field naturalists will gladly learn that the removal of ferns and other interesting stream-side flora is punishable under the Act.

III.—Types of Victorian Forest.

Pure Forest.—Of the whole timbered area there is comparatively little that can be regarded as pure or one-species forest. Two species lay claim individually to certain areas, and these, in appearance, grain, and colour of wood, other economic uses, and ecology, vary widely. They are *Eucalyptus rostrata*, the River Red Gum, and *E. regnans*, the Giant Gum. Along the Murray and Goulburn Rivers chiefly, and the lowland portions of their tributaries, but also spreading over flat lands of the south-west and fringing such water spaces as Lake Lonsdale, and, by means of water-courses, even penetrating the Mallee, the River Red Gum flourishes, requiring much moisture at foot, but capable of bearing high atmospheric temperatures. In quantity and area entitling it to the dignity of *forest*, one must seek it in Gunbower and Barmah districts, or along the Ovens River, between Yarrawonga and Wangaratta. Such forests are broken into at places and almost traversed at others by higher ground bearing trees of the box type *e.g.*, *E. hemiphloia*, Grey Box, and *E. bicolor*, Black Box. *Eucalyptus regnans*, Giant Gum, is to be found at its best on the southern slopes of the sub-alpine regions of Eastern Victoria and the Otway Ranges, and may be found exclusively occupying comparatively large areas in such situations as Mount Baw Baw, Mount Dandenong, Beenak Ranges, Cerberean Ranges, &c., while

at times it freely mixes with a few other highland species. A few species monopolize smaller areas—*e.g.*, *E. paludosa*, a swamp gum which delights in damp flats, and there resembles *E. rostrata* in general appearance, and, like it, may be found on slightly higher ground; *E. Delegatensis*, Victorian Woolly-butt or Red Ash, another sub-alpine tree, but confined to North-Eastern Victoria; *E. obliqua*, as its vernacular, "Messmate," suggests, is less exclusive, but in some highland areas, and in the Wombat and other forests, enjoys a monopoly of fairly extensive tracts. Elsewhere we have, in different classes of country, smaller areas in which the dominant species form groves. Thus, in the midst of other timbers, or alternating with belts of other species, may be found *Eucalyptus amygdalina*, *E. sideroxylon*, *E. hemiphloia*, &c. Groves of *Fagus Cunninghami*, the Myrtle Beech, in the highland glens of Otway and Gippsland, are miniature pure forests. Similarly, in the North-West (the Mallee), dwarf eucalypts of a single species form small pure forests topographically limited, while exclusive groves of arboreous—and therefore in that locality conspicuous—trees are composed of Callitris or Casuarina.

If a line be drawn from Woodend, on the northern plain, to the summit of Mount Macedon, a distribution in vertical zones may be noted. On the flat, *Eucalyptus paludosa*, a swamp gum, is in possession; at the base of the mount a belt of mixed forest consists of *E. amygdalina*, *E. viminalis* (stunted), *E. cæophora*, &c., which, as we ascend, gives way to a predominance of *E. obliqua*, and through a pure belt of the last-named species we suddenly reach a summit-capping, shrubby eucalypt, *E. coriacea*, which marks the region of occasional snows at 3,500 feet. This is the northern aspect. Continuing the line over the summit and down the southern slopes, and neglecting, for the moment, the exotic pines, we have, before reaching the Messmate, a belt of "Gum-top Messmate," possibly a form of *E. pilularis*, which in general aspect suggests affinity with the Messmate and the Giant Gum, and luxuriates on the shady side of the mount. Lower, it mingles with *E. obliqua* and tall, straight trees of *E. viminalis*, which become stunted as we descend to the altitude attained on this side by *E. paludosa* and *E. amygdalina*. Here we have in the whole a mixed forest with pure forest patches, the result of topographical conditions and aspect. In the Won Wron forest, in Gippsland, comparatively low, undulating country carries valuable timber in considerable areas, consisting of a single species. This is the Yellow Stringy-bark, *Eucalyptus Muelleriana*. It may be found, in the same reserve, in isolated patches and belts, or associated with other species of eucalyptus, such as *E. hemiphloia* and *E. Engenoides*, and

with Casuarina and Banksia. A few Banksias and Casuarinas form groves of notable area at low altitudes, the aggregation depending largely on soil and aspect—*e.g.*, the Banksia grove at the northern extremity of Mount Vereker, fairly low and sheltered, and the Casuarina grove on the higher, wind-blown, seaward slopes of the west coast of Wilson's Promontory. In swampy regions great thickets of the tea-trees *Melaleuca cricifolia* and *M. squarrosa* may be seen at Wilson's Promontory and elsewhere.

MIXED FORESTS.—These are the rule rather than the exception. An example for study is close at hand in Studley Park and the Asylum Reserve at Kew. On the low Silurian hills between which and the basalt plain the Yarra River flows tortuously from Fairfield to Hawthorn, there is an intermingling of species that may be found in many other parts of the State. Here we have *Eucalyptus rostrata*, *E. viminalis*, *E. melliodora*, *E. paludosa*, and *E. leucoxylon*, sometimes ascending approximately in horizontal belts in the order as written, but at others with *E. viminalis* at the stream side, and, again, with *E. paludosa* reaching the crest of the spur nearly: but, where the soil is hungriest and the hill-tops most stony, there *E. leucoxylon* is almost without rival, but stunted and wind-blown. In other Silurian country, such as near Tooborac, in the Heathcote district, the mixture comprises the following encalypts:—*E. melliodora*, *E. hemiphloia*, *E. polyanthema*, *E. macrorrhyncha*, *E. cladophora*, and *E. sideroxylon*, with *E. viminalis* and *E. rostrata* on the flats, but with no species monopolizing extensive areas.

(*To be continued.*)

A FISHING NOTE.—"Not long ago, while fishing for schnapper with my son, on hauling up a fish, which seemed unusually heavy, and bringing it to the surface, we found it enwrapped in the tentacles of an octopus of a fair size. The conjoint weight of the two broke the hook. We then shifted our ground about a quarter of a mile away, when an exactly similar accident occurred. Although we have fished a good deal before, it is the first time such a thing has ever happened to us. We have often had sharks take our fish when being drawn to the surface, but not an octopus. I also noticed lately, when sitting on the bank of a creek, a Porcupine Ant-eater or Echidna come down the bank on the other side, but apparently slip into the water. He seemed rather to enjoy it than otherwise, and swam freely for some distance. This was the first time I had observed one of these animals swimming." A. RUTTER CLARKE, Toorak.

A YEAR AMONG THE ORCHIDS: A REMINISCENCE.

By E. E. PESCOTT, F.L.S., AND C. FRENCH, JUN.

(*Read before the Field Naturalists' Club of Victoria, 12th July*, 1915.)

THE prosecution of one's nature hobby under natural conditions is always pleasant, and as the scenes are revisited each season to obtain fresh specimens and to conduct newer observations a naturalist cannot be other than reminiscent. In fact, reminiscences "crowd thick and fast," till one is apt to forget the present amidst the memories of the past.

The orchid season of 1914–15 has been somewhat out of the ordinary run of seasons, in that it presented many features of interest, and, owing to the climatic vagaries consequent upon the drought, many unusual developments were noticed. It has been suggested, owing to the drought, that orchids were far less prevalent during the past summer than in the normal seasons. That was not the case, however. For instance, between Ringwood and Bayswater—a famous orchid district—in October, a total of twenty species was collected, with two white varieties, making twenty-two species and varieties in all. Again, at Cheltenham, eleven species were collected, and twelve at Oakleigh. It is noted with great regret, from a naturalist's standpoint, that the rich locality of Ringwood and its environs is fast becoming settled, the soil and aspect having been found most suitable for apple-growing: and it is to be feared that, ere long, our orchid paddocks will be no more, having succumbed to the axe and the plough, and so to provide apples for the world's markets. Hence it will not be long before we shall have to go further afield for wild-flowers.

Thirty years ago Mr. George Coghill exhibited at the Club—in May, 1884—five species of orchids which he had collected at Hawthorn. These included *Pterostylis vittata*,* *P. præcox*, *P. nutans*, *P. concinna*. One would look there in vain for such orchids now, and, indeed, he would be laughed out of court were he to suggest an orchid hunt at Hawthorn nowadays. Apparently the same will be said of Ringwood in a few years' time.

One of the nearest spots to Melbourne where orchids may yet be seen is at Ashburton. Here is now the terminal limit of the coastal flora, which once extended from Sandringham and Cheltenham through Oakleigh and Ashburton to Canterbury. Any remnants have long since gone from Canterbury, and probably Ashburton will soon be civilized, for the paddock in which the orchids were noted has now been fenced, and

*Mr. Coghill informs us this is an error, as he never collected *P. vittata* at Hawthorn. The locality should have been Sandringham. He says it is plentiful at Point Lonsdale.—E. E. P. and C. F.

the fence is always the precursor of the floral loss. Here were noted *Pterostylis nutans*, *P. concinna*, *Acianthus exsertus*, and *Corysanthes pruinosa*.

To collect *Pterostylis vittata* a visit would need to be made to Sandringham: and even here this orchid is fast becoming rare. This year, among the coastal tea-tree, where we previously collected dozens of plants, only a fair number were found, and these after a close hunt among the bushes. Also, at Ebden Park, where this orchid and others were formerly abundant, the advance and increase of seaside residences are fast destroying this erstwhile famous collecting ground.

Pterostylis concinna is still exceedingly plentiful under the tea-tree at Sandringham and Beaumaris, and, both last season and this, it has been a charming early winter visitant. *Cyrtostylis reniformis* and *Caladenia Patersoni* are also in evidence along the coast. Here, also, a few plants of *Corysanthes pruinosa* were found: previously, too, these were plentiful along the beach hills. But on the sandy hills near Cheltenham, and in the open scrub beyond Oakleigh, this species is still to be found in abundance. This season one colony was found which must have contained many thousands of individual plants so closely set in an irregular area of about eight yards across as to almost overlap each other, and exclude every other plant. The mate to this species, *Corysanthes unguiculata*, which was first found at Oakleigh by Mr. C. French, jun., in June, 1890, will soon be extinct in its original locality. The paddock where it grows is now used as a pasture for cows, which are eating up and tramping down the clumps of *Melaleuca squarrosa*, which is the natural cover for the orchids. Rabbits, too, have discovered that orchid tubers are edible, and this year it was noted that these rodents were scratching up the young plants of *Pterostylis pedaloglossa*, and eating both plants and tubers. In another instance, a colony of ants had excavated under and completely covered up a growing patch of this orchid. Last year only half a dozen plants of *Corysanthes unguiculata* were found: but this season several dozen were observed. Surely this would lead one to consider that in an unfavourable season the tubers remain dormant in the soil.

Pterostylis pedaloglossa, too, presented an unusual problem. For the last two seasons, although hundreds of plants were noted, only one flower was seen, and that was in 1914. In the same paddock it was previously possible to collect flowers of *Pterostylis nutans* by the thousand: but, now that cows and rabbits have found these plants palatable, this species, while common and yet interesting, is here fast disappearing. Another factor connected with the disappearance of this orchid is the increase in the spread of certain weeds. In one corner of the

tea-tree, a colony of this orchid, which was abundantly present in 1914, was almost smothered in 1915 by the luxuriant growth of the English Dandelion, *Taraxacum officinale*, and the Sorrel, *Rumex acetosella*, the seeds of these introduced weeds having been spread by the agency of stock manure.

In this locality this season a small albino or variegated form of *Pterostylis nutans* was found. The plant had three leaves, and, under cultivation, has since developed a fourth. This interesting break of albinism is not common among the orchids.

In the heath lands last year it was quite impossible to collect a single flowering specimen of *Lyperanthus nigricans*. Frankston, Sandringham, Black Rock, Beaumaris, Cheltenham, and Oakleigh were all searched over, but they refused to yield up even one flower. Thousands of plants were found dead everywhere, and this quite early in September. This was probably owing to the dryness of the winter and the heat of early spring. The check to the flowering of the plant, and the death of the foliage, did not interfere with the life of the tubers. Many of these were dug up, and they appeared quite normal, though rather small. This year the foliage is as plentiful and as vigorous as ever.

Two other species which are usually plentiful were not found by us in the metropolitan area last season, although diligent search was made in their usual localities. These were *Gastrodia sesamoides* and *Orthoceras strictum*. The same localities will be searched again this season to see if they have survived the drought. The former, however, was found at Yering Gorge by Dr. C. S. Sutton in November, and by Mr. C. French, jun., at Korumburra during the first week in December. In the latter case the tubers were exceedingly large. It is strange that this orchid should have been so scarce last year, for its congener, *Dipodium punctatum*, was plentiful in all of its usual haunts at Healesville, Ringwood, Croydon, Bayswater, Tyabb, &c. One plant was noticed at Ringwood 37 inches in height, with fifty-three individual flowers on the spike: a plant was also collected at Black Rock as late as 17th March, and this only had one flower expanded. Thirty years ago *Dipodium punctatum* was very common in the river paddocks at Richmond and Burnley, but here it has long been extinct. These two hot-season orchids are usually credited with being parasitic upon gum-tree and other roots. At Ringwood this season one plant was carefully dug from the soil, and no roots or tree stumps were in close proximity to the tuberous roots. It has recently been ascertained that *Gastrodia elata*, a Japanese species, only flowers when attacked by the root-rot fungus, *Armillaria mellea*, which lives in symbiotic relationship on the orchid tubers. If this be so, it may be found that the same

biological condition is responsible for the flowering of our own local species. This fungus is common in the soils everywhere in the Victorian bush, and it does not favourably develop in hot, dry weather. So it may be suggested, presuming the fungus operates on our own species, that the hot, dry season prevented the fungus developing and growing, and, as a result, the tubers did not receive the force necessary to stimulate flowering.

The genus Prasophyllum was also somewhat scarce last year. With the exception of three species which were found abundantly at Healesville, only a single specimen each of *Prasophyllum Archeri*, at Emerald, and *P. despectans*, at Bayswater, were collected. *Prasophyllum fuscum*, *P. brevilabre*, and *P. australe* were growing intermingled at Healesville, and, casually, it would be very easy to confuse the species, except for the dainty fragrance of *P. fuscum*. One fasciated spike of this species was collected, having fifty-one flowers. *Prasophyllum elatum*, which is plentiful enough in most seasons, was not found at all.

A genus which might be expected to suffer considerably, or even to be markedly absent, owing to the dry, hot season, is Pterostylis: but that was not the case, for, in all, fourteen species were collected, according to their season, and, with the exception of *P. pedaloglossa*, which has been previously referred to, all were flowering well. *P. parviflora*, which flowers in the autumn, and which might reasonably have been expected to suffer, was well in evidence in several collecting-grounds. It was noticeable of this species that the taller and more robust specimens were found on the stiff, dry, clay soils, while the small plants, frequently with only a single flower, were mostly growing in the humid and peaty soils of the tea-tree area. The queer, hairy-tongued species, *P. barbata*, too, was fairly abundant. The naming of *Pterostylis falcata*, which has been confused with *P. cucullata*; the raising to specific rank of its variety as *P. alpina*; and the placing of *P. Mackibbini* as a synonym of *P. cucullata*, all by Dr. R. S. Rogers, M.A., the well-known Australian orchidologist, has previously been referred to at the Club. Both *P. falcata* and *P. alpina* were collected along the Watts River in October, where they grow fairly profusely.

The three genera which delight in the summer sun, Thelymitra, Diuris, and Caladenia, were all very plentiful, the season apparently not having affected them at all, unless to cause them to blossom profusely. *Diuris alba* flowered beautifully, both naturally and under cultivation, while *D. longifolia* and *D. pedunculata* were very abundant at Ringwood. *D. punctata* is becoming rare within fair range of the metropolis, but one occasionally hears of good numbers of blooms in

distant country localities. Many of the Thelymitras were abundant. Ringwood was gay with *T. aristata* and *T. ixioides*, while Frankston and elsewhere were fragrant with dainty *T. antennifera*. With the exception of the beautiful *T. epipactoides*, the genus seems to be as prevalent as ever in the various localities, but this one species is fast becoming very rare. It was not found even after much hunting during the past two seasons. With the exception of *Caladenia filamentosa*, every Victorian species was observed, *C. Cairnsiana* being exceptionally fine. *C. discoidea* is still retained on the Victorian lists, although it is purely a Western Australian species. It is very probable that this species has crept into Victorian records by accident or by error. The long-petalled form of *C. Patersoni* was not very frequent, but the variety known as *C. dilatata* was much more prevalent. On the whole, the Caladenias and the Thelymitras, with *Glossodia major*, seem to be among the hardiest of our orchids and to resist most the advances of civilization.

One orchid that is fast disappearing from its usual resorts is *Spiranthes australis*. This plant was formerly common, growing in the moist flats along the various upper reaches of the Yarra in the Warburton district. In a few years past it was easily possible to collect over one hundred flower-spikes in one particular paddock; but this year—January—we considered ourselves fortunate in finding only a dozen flower-spikes. The paddocks have all been sown down with pasture grasses, and sheep and cattle have been turned in to feed on the grass, and incidentally on the orchids. Other areas, too, are being drained and planted with fruit trees, so that here, soon, *Spiranthes australis* will cease to exist. It would not have been possible for us to collect even these dozen flower-heads only that they were growing in Cyperus tussocks, in very wet and swampy parts of the paddock. Several remains of plants were found, the tops of which had been eaten by the stock. In the tussocks the plants were often three feet in height.

Lyperanthus (*Caladenia*) *suaveolens* was missing from its home in Croydon, apple and pear trees having taken its place; but at Bayswater it is still fairly frequent, and, notwithstanding the dry season, some of the spikes were very fine.

An interesting reminiscence is the fact that *Calochilus campestre*, in years gone by, was very prevalent, and was frequently exhibited at the Club, while its mate, *C. Robertsoni*, was considered as uncommon. In 1884 Mr. C. French, sen., writing on our orchids, records *C. campestre* as becoming scarce, while he had never collected *C. Robertsoni*. Nowadays we frequently find *C. Robertsoni*, but very rarely *C. campestre*. Probably the former is the hardier of the two, and so has been less affected by the modern civilizing influences.

Among the less numbered genera several species were collected. *Chiloglottis Gunnii* was very plentiful at Wandin, growing in the dry soils. One plant was found growing in the moss on a low island in the Watts River at Healesville. The two Acianthus, *A. caudatus* and *A. exsertus*, are still with us in fair numbers, the latter being the more common. *Cryptostylis longifolia* is also well represented, although at Ringwood and at Oakleigh live stock are beginning to eat it up. Under cultivation, this orchid flowered bountifully this season. Its mate, *C. leptochila*, was fairly abundant at Gembrook, but, while very many plants were noted, not one flower-head was seen. The dry season, again, was possibly responsible for this.

The two species of Eriochilus—*E.* (*Caladenia*) *fimbriata* and *E. autumnalis*—are yet abundant, and it was pleasant to note how sweetly fragrant *E. autumnalis* was, in the warm, dry weather of April and May. *Microtis porrifolia* was abundant in old creek beds at Ringwood, and elsewhere in moist localities. *M. atrata* was very common at Coldstream. *Glossodia major*, a warm weather and hardy orchid, was this year very variable. At Ringwood, Oakleigh, and at many other places, it was fairly common. In normal seasons, in the State Forest at Chiltern, this lovely and yet common orchid usually carpets the ground in great profusion: but this year a drive through hundreds of acres of the forest revealed only five individual flowers. Probably, as in the case of *Lyperanthus nigricans*, the foliage developed, but shrivelled on account of the dry weather.

And so, out of the ninety-six species recorded for Victoria in the past year, we have observed a total of sixty-two, or nearly two-thirds of all the species. The outstanding feature of our observations is the undoubted fact that, owing to the inevitable spread of cultivation and settlement, the family of orchids, which is so wonderfully interesting, is fast passing away from our midst. Unlike other classes of plants, this one does not readily lend itself to cultivation, nor does it survive for any time on settled lands, and it is thus impressed upon us that, while they are yet with us, we should study them, and so record for future generations tales of the plants which will then, no doubt, be extinct.

VERNACULAR NAMES FOR VICTORIAN PLANTS.—The August number of the *Journal of Agriculture of Victoria* contains a further instalment of the provisional list of vernacular names, comprising the orders from Callitrichiaceæ to Umbelliferæ. This part includes the Myrtaceæ, among which are many beautiful shrubs worthy of garden cultivation, also the different species of eucalypts, for which the selection of suitable vernacular names proved a very difficult task.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 13th September, 1915.

The president, Dr. C. S. Sutton, occupied the chair, and about forty members and visitors were present.

REPORTS.

A brief report of the excursion to Mitcham on Saturday, 14th August, was made by the leader, Mr. G. Coghill, who said that about twenty members and visitors attended the outing. The course taken was along the Quarry-road to the Mullum Mullum or Deep Creek, and thence *viâ* Park-road to the starting-point. The wattle bloom, to view which was the main object of the trip, was not so fine as was expected, and only about thirty species of wild-flowers were collected, none being of any especial note.

Dr. C. S. Sutton reported that, despite the unfavourable nature of the afternoon, thirty-eight members and friends journeyed by motor-bus to Warrandyte on Saturday, 28th August. The object of the trip was to view the Silver Wattles growing on the banks of the Yarra. The trees, when in full bloom (as the party confidently expected to find them), are a beautiful sight, but unfortunately only one tree seemed to have bloomed well this season, and that was past its highest stage of perfection. However, the fruit-trees in the numerous orchards along the route afforded some solace by a lavish display of blossom. On the outward journey a stop of short duration was made to afford the party an opportunity of collecting *Acacia acinacea* and other flowers on the roadside and in the adjacent paddocks. After tea the return journey was begun, and the city reached shortly after 7 p.m.

The leader, Mr. J. W. Audas, F.L.S., reported that the excursion to Springvale on Saturday, 11th September, was well attended, the party numbering forty-six, including several students from the Training College. The weather was all that could be desired, being delightfully fine and cool. Soon after leaving Oakleigh some of the earliest of our wild-flowers were observed growing in the railway enclosure, the more noticeable being *Anguillaria* (*Wurmbea*) *dioica*, *Hypoxis glabella*, and *Chamæscilla corymbosa*. On leaving the station the party followed the railway line, in the direction of Clayton, for a short distance. Here many plants were noticed in flower, the

most prominent being *Dillwynia cinerascens*, *Hibbertia stricta*, *Bossiæa cinerea*, and *Platylobium obtusangulum*. Growing abundantly near the edges of swampy ground, fine tall specimens of *Craspedia Richea* and *Brachycome cardiocarpa*, Swamp Daisy, were noticed, forming an attractive combination of yellow and white. In very moist or half-submerged places the flowering stems of *Villarsia reniformis*, Yellow Marsh-flower, were observed just coming into bloom. Several naturalized aliens were seen, including the Vetch, or Tare, *Vicia sativa*, Stagger-Weed, *Stachys arvensis*, Corn-Spurry, *Spergula arvensis*, and Fumitory, *Fumaria officinalis*. These were growing adjacent to the railway line, and had probably germinated from seed dropped from fodder during transit. Leaving the railway enclosure, we proceeded in a southerly direction, passing *en route* a hedge of *Acacia armata*, well out in flower, and further on we viewed a plantation of *Boronia megastigma*, which thrives well in this district, and is cultivated extensively for market purposes. We also noticed a fine clump of Black Sheoke, *Casuarina suberosa*, evidently reserved for shelter purposes. As we wended our way through the heath country quite a large number of wild flowers were found in bloom, fully fifty species being noted. Of these the following might be mentioned :—*Aotus villosa*, *Pultenæa Gunnii*, *Ricinocarpus pinifolius*, *Pimelea phylicoides*, *Daviesia ulicina*, *Stackhousia spathulata*, *Tetratheca ciliata*, and *Acacia oxycedrus*, the most prominent and prevailing species encountered being *Hibbertia fasciculata* (yellow) and *Leucopogon* (*Styphelia*) *virgatus* (white). The Sundews, *Drosera Whittakeri* and *D. glanduligera*, were very abundant, and in places could be counted by the hundred, while the Swamp Club-Moss, *Selaginella uliginosa*, was very plentiful. It was noticed that where the ground had been cleared of scrub the heath and other small plants grew more luxuriantly. Four species of orchids were found in flower—namely, *Diuris longifolia*, *D. sulphurea*, *Glossodia major*, and *Pterostylis nutans*, the latter being the most plentiful. It was noticed with regret that the fine collecting ground to the south of Springvale railway station, though fourteen miles from the metropolis, was being rapidly enclosed for cultivation ; consequently, lovers of wild-flowers will soon have to go further afield.

GENERAL BUSINESS.

The president, Dr. C. S. Sutton, said members were already aware that the Club purposed holding a wild-flower show in the Athenæum Hall on the afternoon and evening of 28th inst., and presenting the profit arising from a charge of 1s. for admission to the Sick and Wounded Soldiers' Fund. The object was a laudable one, and, he felt assured, would command a willing and whole-hearted response from all.

Mr. F. G. A. Barnard said that, in common with other members of the Club, he regretted the continued absence through ill health of Dr. T. S. Hall from the meetings. It was well known that our past president took a keen interest in the welfare of the Club. At the recent Club visit to the University Biological School, Dr. Hall, acting in the capacity of leader, had, he was afraid, overtaxed his strength. No doubt it would be cheering to him to receive some communication, written or oral, from the Club, assuring him of the members' hearty wishes for a speedy return to good health. He would move a resolution to that effect.

Messrs. Wisewould, Pitcher, Chapman, and the chairman spoke in favour of the resolution, which was carried unanimously.

PAPER READ.

By Mr. G. A. Keartland, entitled "A Study of Birds at Nesting Time."

In detailing a number of interesting observations arising out of a long study of birds at the nesting time, the author expressed as his opinion that the same set of rules which influenced the nidification of our domestic breeds also operated in the case of wild birds. The dominant factor was the desire of perpetuating the species, and this was as strong in the wild as in the domestic stock. The cause actuating the male bird in many species of the feathered tribe to destroy the eggs of the female needed elucidating. The male Green Leek Parrot, *Polytelis barrabandi*, was a pronounced malefactor in this respect. The eggs he exhibited that evening comprised one of several clutches destroyed by the male of a pair he had had in captivity. The female, when in the wild state, circumvented this inexplicable behaviour of her mate by selecting a hole wherein to rear her young which, whilst it afforded sufficient room for him to descend and feed her, prevented him reaching the eggs save by a frontal attempt, that she readily and easily repulsed.

Mr. J. Gabriel, in discussing the subject, stated that he had known a female Grass-Parrakeet, *Neophema elegans*, to lay thirty-four eggs (many more were broken) in a season whilst in captivity, and a Californian Quail to lay sixty-two eggs.

NATURAL HISTORY NOTE.

The president, Dr. C. S. Sutton, said that whilst standing at a break in the mangroves bordering Kororoit Creek on Saturday, 11th September, watching the movements of a beaver rat, he noticed a Little Penguin, *Eudyptula minor*, in pursuit of a shoal of minnows. The bird did not evidence the slightest fear of him, and on several occasions followed its quarry almost to his feet.

Mr. J. Gabriel remarked that the Little Penguin was a voracious feeder, and instanced a case wherein seventeen large-sized pilchards were taken from the body of one bird.

REMARKS ON EXHIBITS.

In referring to his exhibit of herbarium specimens of *Eucalyptus Risdoni*, Mr. P. R. H. St. John said the Blue Peppermint was a native of Tasmania, but the trees whence the specimens shown were obtained are growing at Titanga Station, Lismore, Victoria. This species of eucalypt was unique by reason of bearing sessile and petiolate leaves on its branches at the same time. The other exhibit, the little Adder's Tongue Fern, *Ophioglossum vulgatum*, though widely distributed, was seldom collected, and its life-history was not very well known. Thousands of specimens of this minute fern might have been collected in quite a limited area at Altona on 11th September.

Mr. G. Coghill, in the course of his remarks on the six varieties of acacias he exhibited from Mooroolbark, said that in the locality mentioned the Myrtle Acacia, which was undoubtedly one of our best from a florist's point of view, was considered a nuisance by the land-holders there.

Adverting to the specimen of *Acacia pycnantha* exhibited by Miss Amy Fuller, showing gall growth, Mr. A. D. Hardy said the whole of the raceme of flower-headlets was involved, and these had been converted into large, solid, circular growths. It appeared to him that the amount of nutriment that was necessary to bring about this abnormal condition of the inflorescence must be quite equal to that essential to the production and maturing of the fruit.

Mr. J. Searle drew attention to his exhibit of an undescribed Copepod. It was the largest of the genus yet found, and occurred in the Yarra Valley. He purposed naming it *Boeckella major*.

Remarks were made by Mr. F. Pitcher on *Acacia leprosa*, var. *tenuifolia*, and by Mr. G. A. Keartland on the eggs of *Polytelis barrabandi*.

EXHIBITS.

By Mr. G. Coghill.—Blooms of *Acacia myrtifolia*, *A. stricta*, *A. dealbata*, *A. longifolia*, var. *mucronata*, *A. leprosa*, *A. verticillata*, *A. myrtifolia* (cultivated), *Pultenæa Gunnii*, *Kennedya monophylla*, *Comesperma volubile*, *Hakea ulicina*, fruit of *Hakea nodosa*, *Loranthus pendulus*, *Goodia lotifolia*, from Mooroolbark; *Hovea longifolia*, var. *aspera*, from Warburton.

By Mr. J. E. Dixon.—Five species of Beetles, Amycterides (Curculionidæ), from Portland and Ouyen, recently described as new by Dr. E. W. Ferguson, of Sydney.

By Mr. G. A. Keartland.—Eggs of the Green Leek Parrot,

Polytelis barrabandi, after being sucked by the male bird; these eggs were laid in an aviary.

By Mr. F. Pitcher.—Blooms of *Acacia brachybotrya*, Silver-leaved Mulga, *Acacia cyanophylla*, Blue-leaved Acacia, *Acacia crassiuscula*, Thicket Acacia, *Acacia leprosa*, Australian Hickory, and var. *tenuifolia*, Slender-leaved Australian Hickory, *Acacia saligna*, Golden Wreath Wattle, grown at Melbourne Botanic Gardens.

By Mr. D. J. Paton.—Blooms of *Eriostemon obovalis*, *E. sediflorus*, *Grevillea lanigera*, *Bœckea diffusa*, *Aster ramulosus*, *Acacia sclerophylla*, *A. acinacea*, and *A. montana*, from Bendigo district.

By Mr. J. Searle.—An undescribed Copepod, to be known when described as *Boeckella major*.

By Mr. P. R. H. St. John.—Herbarium specimens of *Eucalyptus Risdoni*, Hooker fils., Blue Peppermint, Tasmania, from a cultivated tree on Titanga Station, Lismore district, Vic.; dried specimens of *Ophioglossum vulgatum*, Linn., Adder's Tongue Fern, collected by Dr. C. S. Sutton and Mr. P. R. H. St. John on 11/9/15 in Altona district, found also in New South Wales, Queensland, Northern Australia, South Australia, Tasmania, Europe, Asia, Africa, and America.

By Mr. E. E. Pescott.—Blooms of twenty-one species of orchids—viz., *Acianthus caudatus*, *Glossodia major*, *Caladenia dilatata*, *C. cærulea*, *C. carnea*, *C. suaveolens*, *C. latifolia*, *C. Patersoni*, *C. cairnsiana*, *Diuris longifolia*, *D. maculata*, *D. pedunculata*, *Pterostylis longifolia*, *P. nana*, *P. mutica*, *P. nutans*, *P. barbata*, *P. curta* (twin flowers), and *P. concinna*; these were mostly from the Ringwood district. Also a Caladenia and a Diuris which did not agree with any recognized species or variety.

By Miss Amy Fuller.—Twig of *Acacia pycnantha*, showing inflorescence converted into large, solid, circular galls.

By Mr. J. G. O'Donoghue.—Photograph of motor party, Warrandyte excursion, 28/8/15.

The meeting terminated after the usual conversazione.

Microscopical Society of Victoria.—The seventh annual meeting of this society was held on 27th September, when a very satisfactory report of the year's work was presented. Mr. J. Searle, a well-known member of the F.N.C., was elected president for the ensuing year. The last monthly leaflet of the society shows that the work of investigating the micro-fauna of the Botanic Gardens lake is steadily progressing, and some interesting results may be expected when a larger number of visits to the lake have been made.

THE LATE MR. CHARLES FROST, F.L.S.

Elected thirty years ago, the late Mr. Charles Frost may be considered to have been one of the pioneer members of the Field Naturalists' Club of Victoria. Though latterly he had taken little part in the activities of the Club, and consequently was almost unknown to a large number of the present members, for many years he was an active worker on its behalf. He served as a member of committee in 1889–90 and 1890–91, as vice-president in 1891–2 and 1892–3, and as hon. treasurer in 1894–5, 1895–6, and 1896–7. Besides taking this share in the official work of the Club, he took part in three of its most arduous exploring trips—viz., to King Island in November, 1887; the wilds of Croajingolong in December, 1888; and the visit to the Yarra Falls in November, 1890. During these trips he proved himself a hard worker and enthusiastic naturalist, making many friends among his companions, and it came as a great shock to them to hear of his almost sudden death, at the age of 62, on Saturday, 18th September, for, only a few days before, he had been present, apparently in the best of health, at a little reunion of kindred spirits held to celebrate the birthday of Mr. Chas. French, sen., to whom belongs the title of "father" of the Club. Mr. Frost was stricken with apoplexy on the previous Wednesday, and, as he did not regain consciousness, his passing away was accompanied by particularly sad circumstances. He was a good all-round naturalist, and had given considerable attention to lizards and snakes. In conjunction with Mr. A. H. S. Lucas, M.A., first editor of the *Naturalist*, now of Sydney, he published a comprehensive paper on the lizards of Victoria in the *Proceedings of the Royal Society of Victoria*. The same writers dealt with the lizards and snakes of the Horne Exploring Expedition to Central Australia. He also did some work on spiders, and contributed a couple of papers to the *Naturalist*, besides giving a lecturette on these interesting creatures at a Club conversazione. His spirit collection of lizards and snakes is to be handed over to the National Museum, Melbourne.

Exhibition of Wild-Flowers.—The exhibition of wild-flowers held by the Field Naturalists' Club at the Athenæum, Melbourne, on Tuesday, 28th September, in aid of the Wounded Soldiers' Fund, was a very great success, and appeared to give genuine pleasure to the large number of visitors attracted to it. It is expected that nearly £50 will be available for the fund when the accounts are finally made up. The committee desires to thank those members and friends who worked so energetically and brought about such a fine result. We hope to give a detailed account of the exhibits in the next *Naturalist*.

A VISIT TO THE LAKES NEAR COLAC AND CAMPERDOWN.

BY J. SEARLE AND J. SHEPHARD.

(*Read before the Field Naturalists' Club of Victoria, 9th Aug.*, 1915.)

THE volcanic plains of the south-western part of the State offer many attractions to the field naturalist, whether he be a zoologist or geologist. The latter may find profitable study in determining the sources of eruption and relative ages and direction of the vast flows of basalt that cover most of this district. The origin of the lake system is also an interesting problem.

For the zoologist there is a vast amount of work to be done in the investigation of the faunistic contents of the numerous lakes that are scattered over this part of Victoria. This work is practically untouched, and it was this fact that led the writers of this paper to take a brief collecting trip to the Colac district, the result of which they bring under the notice of members of the Club this evening.

Leaving Melbourne by motor-car on Saturday morning, 5th June, we were soon travelling over the basalt plains beyond Footscray, and appreciating the excellent work done, and in progress, on considerable sections of the Geelong road, under the direction of the Country Roads Board. After a brief halt for a frugal lunch at Geelong, we soon found ourselves across the Barwon and on the really good road commencing about six miles out. Passing Winchelsea, the extensive views stretching southward to the Otway Ranges compensated for the lack of trees by giving a feeling of expansion, welcome to the town dweller. Colac (95 miles) was reached about 3 o'clock, and, after securing quarters for our stay, we proceeded to the lake, provided with tow-net, hand-nets, and other gear.

The severity of the recent drought was forcibly impressed on us by the shrunken appearance of Lake Colac, then more than six feet below its usual level; and when it is remembered that the lake is about six miles in length and three miles wide, the enormous quantity of water represented by the difference of level of six feet will be apparent. Obtaining a boat, we were soon afloat on the lake, which we found nowhere more than four feet in depth, with a bottom covered with a deposit of black mud—so fine that it passed freely through the meshes of the tow-net. Rowing gently, the tow-net was set in action, and after a few minutes' towing was hauled up, when we were amazed at the large quantity of living matter revealed; the lower part of the net was packed solid with Cladocera, Ostracoda, Copepoda, Rotifera, and smaller forms of life. After

filling a pound jar with this mass, and adding some formalin as a preservative, the net was washed out and again set in action, towing being timed one minute, and as a result a 4-oz. bottle was nearly half-filled with organisms. Finding that if we continued operations with the tow-net we would obtain an embarrassing supply of specimens, we turned our attention to hand-netting, and with the aid of sieves and strainers endeavoured to separate the heterogeneous "takes" until we felt satisfied we had secured a fair sample of the plankton over a distance of two or three miles.

On a previous visit one of us had met with the hydroid Cordylophora, and, remembering this, a search was made, which resulted in the discovery of abundant colonies attached to the posts of the jetty and the stems of water weeds. This interesting animal was at one time plentiful in the Melbourne Botanic Gardens lake, but disappeared for nearly twenty years; curiously, it has again been found abundantly, since the excursion we are recording, by the members of the Victorian Microscopical Society in the same place.

Well pleased with our first day's collecting, we returned to our hotel with an appropriate appetite for the evening meal. Later, we retired to a room, and, as we each had a travelling microscope and a dissecting stand, we were able to examine our captures alive. We hold strongly that a zoologist does not know aquatic microfauna unless he can see the living specimens. One great advantage of microscopic examination on the spot is that if a new animal is observed a further supply can be looked for before leaving. Our examination showed that the most plentiful of the Cladocera was a variety of the widely-spread and variable species, *Daphnia carinata*, the carapace being spineless, or at most possessing a very short projection at the posterior end. *Pseudomoina lemnæ* was also fairly numerous, and there was a good number of *Moina australiensis*. Among the Copepoda, *Boeckella oblonga* was recognized, also a new species of the same genus. Two species of Cyclops were noted, but not identified. Ostracoda were not numerous, no doubt owing to the absence of weeds, the boatman informing us that Black Swans had practically cleared them from the lake. The large and handsome *Cipris mytiloides* was the most noticeable, being found clustering among the algæ taken off the piles supporting the jetty. Only one species of rotifer was observed, but that was enormously numerous, and, although occurring as a free-swimming animal, was mostly found attached to the carapace of *Daphnia carinata*, not being found on any other entomostracan collected. This attachment appeared to enable the rotifer to apply the ciliary action of the corona entirely to the securing of food, as the Daphnia supplied

the locomotive power for itself and guests. Probably the only detriment suffered by the Daphnia was some retardation of its movements due to the scores of rotifers which, in many instances, adhered to a single host, but placed on the carapace out of reach of movable appendages. Treatment with narcotizing agents caused the rotifers to leave their host. This rotifer was a species of the variable genus Brachionus, and may prove new. Caution is requisite in identifying species of this genus, in view of a recent worker on Rotifera having claimed forty-six descriptions as synonymous.

Next morning was cold and wet, but, as our programme for the day was to visit Lakes Gnotuk and Bullen-Merri, near Camperdown, twenty miles distant, we were not deterred by the weather. The road from Colac to Camperdown passes through a very interesting piece of country—the Stony Rises. For some miles the road takes a sinuous track, with numerous short ascents and descents, over and around numberless mounds of loosely-packed blocks of basalt. Possibly an observer familiar with the features of active vulcanicity may read the story with certainty; but without that advantage it is difficult to receive the explanation that the surface features are due to the irregularities of the forward edge of a high basalt flow. The numerous separate depressions appear to be left unexplained. A pleasant description of this part of the road will be found in an interesting paper, "In the Western Lake District," by Mr. F. G. A. Barnard, in the *Naturalist* for December, 1911 (vol. xxviii., p. 158).

As we approached Camperdown the weather improved, the rain stopping on reaching the lakes. The road we took leads somewhat to the south-west of the town and on to the tongue of land between the two lakes, it being possible to drive to the edge of Bullen-Merri. On the hill overlooking the lakes is a nicely-kept public park, provided with well-equipped rest-houses. These are extremely creditable to the providers, and a good example to other public bodies.

No boat being available, we had devised a method of using the tow-net. This was to draw it across bays, controlling it by lines from either side. This scheme proved a failure. The water had receded through evaporation, and on the south-eastern bank, where we commenced operations, there was from fifteen to twenty feet of beach, covered with small shells, *Cocicella striatula*, under which the ground was so soft that it was impossible to walk on it. Further, stumps of trees which had evidently grown when the lake was permanently at a lower level and then been killed by the water rising, now again high and dry, encumbered the ground. These trees, it may be remarked, were hoary with a thick limy covering, deposited by the highly mineralized water of the lake.

After great difficulty, increased by the strong wind blowing and lapping the water into wavelets capped with a soapy spume or foam, some casts were made, with very poor results, and we had to be content with the use of the hand-nets from any stump jutting into the water.

Lake Gnotuk was not very prolific. An amphipod, probably a species of the genus Chiltonia, was fairly numerous. The only rotifer found was *Brachionus mulleri*, a brackish water form, the specimens agreeing closely with the type. Three species of Copepods not yet described, and probably new, were taken. One of these is interesting from the fact that specimens of the same genus, Maræenbiotus, have been raised from dried mud received by one of us from Labrador, Newfoundland. Experiments were made in 1911, when it was first obtained from Lake Gnotuk. A jar of the lake water containing the animals was brought to Melbourne, and evaporation allowed to take place slowly, the object being to see how the animals behaved owing to the increasing salinity. Maræenbiotus continued to live and reproduce until two-thirds of the water had evaporated. At this stage the water was so dense that the animals swam through it with great difficulty, and soon after disappeared altogether. This experiment lasted over five months.

We next tried Bullen-Merri, which is separated from Gnotuk by a strip of land some 700 or 800 yards across, but is about 150 feet higher level. The water in Bullen-Merri is fresh and clear, and, as we were well sheltered from the wind, we hoped for more success with the tow-net, but were disappointed again, as the net scraped along the shelving rocky bottom and was damaged. We therefore again had recourse to hand-netting, and filled our bottles in this way.

A former visit to the lake may be mentioned, when one of us had a somewhat exciting adventure. He had been informed by residents of Camperdown that the lake was bottomless, and that no life existed in it. He was also informed that there was a boat in the vicinity of the lake, so he determined to get the use of the boat and see what the tow-net would discover in the way of animal life. After persistent inquiry he found that the boat belonged to a swimming club. The custodian was found, and permission to use it readily granted; but doubt was expressed as to its condition, as it had not been in the water for two years. There was then a difficulty in finding an oarsman—the day being a stormy one—but one was at last secured. On getting the boat afloat he found the joints in the planking had all sprung, and the water entered freely in miniature fountains. Being determined not to lose the opportunity, so hard to get, of using the tow-net, he persuaded his

assistant, now none too willing, that the leaks would probably stop as the wood swelled with the wet, and, taking a life-buoy that was available, he pushed out from the shore. Two hundred feet of tow-line failed to reach the bottom. Meanwhile, despite constant use of a Mason's jar as a bailer, the water in the boat rose ankle-deep, and hurriedly a number of casts with the net were made at different depths and on the surface. The catch consisted entirely of two species of Rotifera, *Brachionus bakeri* (var. *brevispinus*) and *B. mulleri*, regarded as a salt-water form, though known to occur in very slightly brackish water. These were in immense numbers, together with the nauplius of a copepod. As there seemed a strong probability of the boat foundering, it was with difficulty pulled to the shore in a water-logged condition. Subsequently he learned from the Geological Survey Report that the depth of water was over 270 feet where he tried to effect a sounding.

On the present occasion the short day was ending when we left the lake and commenced to climb up the incline to the crest of the hill, where we had left the car. The necessary inflation of a cover which had flattened during our absence delayed us, so that darkness overtook us long before we traversed the Stony Rises on the return journey to Colac, and the scenery that was so strangely fantastic when we passed through in daylight became weirdly so as the piles of loose stones caught the glare of the headlights and stood out in relief from the black background of shadow; they resembled ruined castles, and brought to mind the uncanny pictures of Doré. Rain came on again in heavy showers, and added to the fantasy by blurring the outlines of the rugged scene.

After a dinner much better than we expected, considering the hour of our arrival, we set to work with our microscopes. The yield of the Gnotuk material has already been mentioned: that from Bullen-Merri was found to consist of large numbers of two species of rotifers, *Brachionus bakeri* (var. *brevispinus*), and another of the same genus, probably *B. urceolaris*: there was also a copepod of the genus Eurytemora. This copepod was taken on a previous visit also, and, we believe, is the first record of the genus in Australia.

Rain continued to fall all night, and was still falling in the morning when we set out for a hurried visit to Lake Corangamite. Local information promised a good metal road, but facts revealed differently, and so much time went in working through the greasy mud of decomposed basalt that there was only time to hurriedly fill a few bottles and turn reluctantly for home. The end of the lake where our sample dips were taken was swarming with the pretty little Brine Shrimp, *Parartemia zietziana*, Sayce, and a copepod entirely new to us,

which may prove to be the type of a new genus. Near the shore was a flock of Pelicans, and the remains of a nesting-place was noted.

Thus ended our collecting trip, and, though time was short and the weather bad, we succeeded in securing several new species as well as other interesting and rare forms. The fact that so much exists in the odd places we touched on induces the belief that a systematic search of any of the lakes we tried will reveal many more new forms of life. Many of the numerous lakes in this district dry completely at times; some have done so permanently; others may do so as agricultural developments go on; and this must result in the loss of aquatic inhabitants, which will thus remain for ever unknown.

WILD-FLOWERS.—Further stimulus to the increasing interest in our native flora will be given by an exhibition at Ballarat on Saturday, 16th October. This will be held at the School of Mines, and Mr. H. B. Williamson, Mair-street, Ballarat, will be glad of offers of assistance from town or country friends.

The Kew Horticultural Society is also offering liberal prizes for exhibits of limited collections of wild-flowers at its show on Thursday, 21st October. Though rather late in the season, it is hoped that several entries will be received. Particulars may be obtained from the hon. sec., Mr. R. Hodges, *Mercury* office, Kew.

OPALIZED FOSSILS OF NEW SOUTH WALES.—A descriptive paper on "Mollusca from the Cretaceous Opal Deposits of New South Wales," by Mr. R. Bullen Newton, of the British Museum, appears in the *Proceedings of the Malacological Society*, vol. xi., 1915, and should be of especial interest to students of Australian fossils. The collection on which the paper is based was obtained during the recent visit of the British Association to Australia. A complete list of opalized fossils from the Australian Cretaceous is included, and four new species are added to those already known. There is a slight error in the locality of the Ceratodus tooth lately described by the present writer, which should be Walgett, county Baradine, New South Wales, and not Baradine. A further corroboration of the age of the opal deposits is afforded by the evidence of the belemnites, *B. diptycha*, M'Coy, generally known as *B. canhami*, Tate, since Mr. G. C. Crick, an authority on the cephalopods, refers them to the genus *Actinocamax*, stating "that without question they denote a Cretaceous age."—F. CHAPMAN, National Museum, Melbourne.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 11th October, 1915. The president, Dr. C. S. Sutton, occupied the chair, and about 60 members and visitors were present.

REPORTS.

A report of the excursion to Pakenham on Saturday, 18th September, was made by the leaders, Messrs. F. Wisewould and R. A. Keble, who stated that the day turned out very fine, but the country was in some parts rather wet under foot. The attendance of members was, however, not so large as had been anticipated. The direction taken was easterly along the old Gippsland road for about a couple of miles, then turning north, near Mount Ararat, for another two miles. At this point a start was made through the bush towards Pakenham Upper, and during this walk of about four miles a fair number of wild-flowers was collected: these included seven or eight species of orchids. From a hill on the route a fine view of the surrounding country, extending from Arthur's Seat at Dromana to the Warburton Ranges, was obtained. After luncheon, Mr. Keble, from the saddle at the head of Gordon's Gully, gave a short account of the physiography of the district, calling attention to the sunken estuary of Western Port and the earth movements which had taken place, and so caused the present appearance of the landscape. From this point at least 1,200 square miles of country were visible. Before starting for the station a visit was paid to the fern gully below. During the day about thirty species of birds were identified.

A report of the excursion to the Dandenong Ranges, from Croydon to Belgrave, on Saturday, 25th September, was given by the leader, Mr. F. Pitcher, who said that the walk of about nine miles was essayed by ten members. The day proved very enjoyable, and fine views were obtained from many points along the route. A large number of flowers were collected for the wild-flower exhibition the following week. Near "The Observatory" some fine Blackwoods, *Acacia melanoxylon*, were seen in full bloom. The orchids *Pterostylis cucullata* and *P. pedunculata* were noted. Near Sassafras Creek fine bushes of *Pittosporum bicolor* and *Zieria Smithii* were in full bloom. At least a dozen ferns could easily be collected there within a radius of a few yards. It was noticed that most of the specimens of *Pittosporum bicolor* had started as seedlings on the

trunks of tree-ferns, and had eventually sent their stems down to the soil, a distance of several feet.

A report of the excursion to Greenvale and Woodlands on Saturday, 2nd October, was given by the leader, Mr. F. G. A. Barnard, who said that thirty members and friends made this trip by char-a-banc. The first halt was made at Gellibrand's Hill, about a mile north of Broadmeadows township, from whence a fine view of the city and northern suburbs was obtained. In the immediate vicinity are some fine specimens of Red Gums, *Eucalyptus rostrata*, while the flowers of numerous small plants, such as the Blue Squill, *Chamæscilla corymbosa*, Hairy Stylewort, *Levenhookia dubia*, Plain Bindweed, *Convolvulus erubescens*, Slender Speedwell, *Veronica gracilis*, and the yellow amaryllid, *Hypoxis glabella*, decked the ground round about. Gellibrand's Hill is the nearest outcrop of granite to Melbourne, and from it the stone for the original Prince's Bridge was obtained nearly seventy years ago. From the hill the party walked through the grounds of the Greenvale Sanatorium into the Woodlands Estate, where a singular granite tor was pointed out. The fine gums with which the estate is splendidly wooded were greatly admired: these include the Yellow Box, *Eucalyptus melliodora*, Manna Gum, *E. viminalis*, and Narrow-leaved Peppermint, *E. amygdalina*. On resuming the journey in the car a run of about two miles brought us to the basalt plain through which the Deep Creek has cut its way, and, descending into the valley by a steep, picturesque gorge, we were soon at Wildwood Bridge. Here, milk and hot water having been obtained at a neighbouring farm-house, afternoon tea was taken. The scene at the bridge was rather pretty, owing to the masses of the Smaller Clematis, *C. microphylla*, entwined about the other shrubs, its feathery-appendaged seeds being nearly ripe. This spot, if it were not so far from town (18 miles), and so difficult to get at except by motor, would be a suitable locality for Club outings, the geological features being so different to those on the eastern side of Melbourne. During the afternoon Mr. P. R. H. St. John identified a number of interesting birds, including three cuckoos. A rapid run home was made, the city being reached about a quarter past seven.

A report of the excursion to Frankston on Saturday, 9th October, was given by the leader, Mr. J. R. Tovey, who said that the party of sixteen members and friends were favoured by a fine afternoon, and a very pleasant ramble had resulted. Over forty species of flowering plants were noted, the most conspicuous being the Wedding-bush, *Ricinocarpus pinifolius*, Pink Swamp-heath, *Sprengelia incarnata*, Blunt-leaved Heath, *Epacris obtusifolia*, Myrrh Tea-tree, *Leptospermum myrsinoides*,

Heath Milkwort, *Comesperma ericinum*, Crowded Parrot-Pea, *Dillwynia floribunda*, and the three orchids, *Glossodia major*, *Thelymitra antennifera*, and *T. longifolia*.

GENERAL BUSINESS.

The chairman stated that Mr. J. L. Robertson, M.A., had suffered a serious bereavement in the loss of his son, Mr. A. J. Robertson, M.Sc., who had lost his life while fighting at the Dardanelles. Mr. A. J. Robertson was a member of the Wilson's Promontory excursion party in December, 1912, and he moved that a letter of condolence be forwarded to his father. This was carried in silence.

The hon. treasurer, Mr. G. Coghill, reported that there would be a balance of more than £50 to hand over to Lady Stanley's Fund for Wounded Soldiers as the profit on the recent exhibition of wild-flowers, which he considered very satisfactory. Mr. F. Wisewould and Mr. J. Shephard congratulated the Club on the splendid display and the excellent result. The chairman moved a vote of thanks to Mr. J. Gabriel for his efforts in connection with the show, which was seconded by Mr. A. D. Hardy, F.L.S., and carried unanimously.

PAPERS READ.

1. By Mr. C. L. Barrett, C.M.Z.S., entitled "Bird Studies with the Camera."

This took the form of an illustrated lecturette, in which the author, by means of a series of lantern slides from photographs he had taken in South Australia, Victoria, Tasmania, New South Wales, and Queensland, described the nesting habits and other characteristics of several of the rarer Australian birds. Rookeries on islands off the coast of Queensland and in Bass Strait were also described, and some account was given of bird-life in Riverina and other places. The need for greater protection for certain species was emphasized. Some of the slides shown were from negatives by Messrs. R. T. Littlejohns and S. A. Lawrence, of the Bird Observers' Club, who have for several seasons been photographing birds at Ferntree Gully and other localities around Melbourne.

2. By Mr. A. D. Hardy, F.L.S., entitled "Our Victorian Forests."

Owing to the lateness of the hour, this paper was held over.

NATURAL HISTORY NOTES.

Mr. E. E. Pescott, F.L.S., said that at the previous meeting he had exhibited two orchids which did not seem to agree with any recognized Victorian species or variety. These he had forwarded to Dr. Rogers, of Adelaide, a well-known authority on this group of plants, with the result that Dr. Rogers had identified them as species already recorded for South Australia.

but new for Victoria. The one, *Caladenia leptochila*, was described by Fitzgerald in 1882. It is a slender species, growing about twelve inches high, the flowers being yellowish and brown, and possessing probably the flattest labellum of the genus. The other, *Diuris palachila*, was described by Dr. Rogers in 1907. It seems to be an intermediate form between *D. maculata* and *D. pedunculata*, while its nearest ally is *D. setacea*, of Western Australia. The labellum is spade-shaped.

Mr. H. W. Davey, F.E.S., called attention to exhibit of a cast skin of a young newt, *Molge pyrrhogaster*. He remarked that the skin was of interest as showing how they are shed entire, and also that when these newts are juvenile they do not eat their cast skins, but allow them to float away in the water, or, if shed on land, to remain as a small ball of skin. The adult newts of this species always eat their cast skins, whether shed on land or in the water, pulling it off and devouring it in much the same way as the European toads do theirs. The skin exhibited was floated on to cardboard, and allowed to dry, in a similar way to the mounting of seaweeds.

EXHIBITS.

By Mr. H. W. Davey, F.E.S.—Cast skin of young newt, *Molge pyrrhogaster* (10 months old).

By Mr. F. Pitcher.—Blooms of five species of Acacia now flowering in Melbourne Botanic Gardens—viz., *Acacia dentifera*, Benth., Toothed Acacia, W.A.; *A. farnesiana*, Willd., Sponge-tree or Cassia, N.S.W., Qld., N.W. and S. Australia, Asia, and Europe; *A. juncifolia*, Benth., Rush-leaved Acacia, N.S.W., Qld., N. and S. Australia; *A. Macradenia*, Benth., Port Mackay Myall or Toney, Qld.; and *A. salicina*, var. *Wayæ*, Maiden, Shrubby Cooba, South Australia; specimen of a pure white form of *Boronia pinnata*, from the Grampians.

By Messrs. E. E. Pescott, F.L.S., and C. French, jun.—Two orchids new for Victoria, but previously recorded for South Australia—*Caladenia leptochila*, Fitzgerald, collected by J. A. Hill, Lubeck, N.W. Victoria, October, 1915; and *Diuris palachila*, Rogers, collected by E. E. Pescott and C. French, Ringwood and Sandringham, and T. S. Hart, M.A., Creswick, October, 1915.

By Mr. J. R. Tovey.—Flower of Chrysanthemum, grown in exhibitor's garden at Mentone; an example of precocious flowering.

NOTE.—The following names of beetles should have appeared on page 84 of October *Naturalist* to complete the record of Mr. J. E. Dixon's exhibit: *Talaurinus perplexus*, *T. hystrix*, *Sclerorinus Dixoni*, *Acantholophus Dixoni*, and *A. brevicornis*, all new to science.

After the usual conversazione the meeting terminated.

EXHIBITION OF WILD-FLOWERS.

THE 1915 exhibition of wild-flowers held by the Field Naturalists' Club of Victoria in the Athenæum Hall, Collins-street, on Tuesday, 28th September, will be long remembered, for two reasons. Firstly, on account of being the first occasion on which the Melbourne public were asked to pay for admission to see wild-flowers only; and, secondly, the reason for holding the display—that by the proceeds the Club might be able to do something towards providing comforts for the Victorian soldiers invalided home from the greatest war in the annals of history.

As is well known, the exhibits for a wild-flower show are far more uncertain up to the last moment than for an ordinary horticultural show, and it was gratifying to the committee to find such a ready response by friends in the country to their appeal for boxes of flowers. Members of the Club also travelled to distant places, such as Gellibrand (Otway Forest), Bendigo, the Brisbane Range, &c., in order that they might secure suitable specimens for exhibition in the best possible condition.

The platform was decorated with some fine fan leaves of our only Victorian Palm, *Livistona australis*, and branches of Lilly-pillies, *Eugenia Smithii*, from the Botanic Gardens, kindly sent by the Director, Mr. J. Cronin, who also forwarded a fine display of blooms of Australian shrubs, &c., as well as with a number of well-furnished eucalyptus saplings and foliage and large bunches of the red and white Native Heath (Epacris), collected at Pakenham and supplied by Mr. F. Wisewould. Some fine masses of bright-tinted young foliage of various eucalypts from Mr. Biggs, and Victorian Beech foliage from Mr. A. D. Hardy, also materially assisted in forming the picturesque appearance which the platform presented from the body of the hall.

The exhibition was opened in the afternoon by His Excellency the Governor, Sir A. Stanley, who congratulated the Club on the interesting display and the amount of enthusiasm aroused in the general public, as indicated by the splendid attendance. During his visits to different parts of Victoria he had obtained much pleasure in exploring its wilder parts and observing its natural beauties. He thought that no person could but admire the wonderful variety of flowers exhibited that afternoon, and he would carry away from the exhibition pleasant recollections, supplanting, for the time, the anxieties of the war.

In the rush of opening the packages and setting out the flowers in the limited time available it was quite impossible to keep a complete record of the collectors and all the localities where

gathered, but the following list will give some idea of the wide range from which exhibits were received:—Stawell (Miss E. Thomas), Deep Lead (S. Uren), Jeparit (D'Alton), Kiata (Misses Brooks), Diapur (J. H. Fenton), Goldsborough, Dunkeld (C. E. Overman), Portland (W. H. Dillon), Heywood, Maryborough (— Garf), Dunolly, Bealiba, Kurting, Wedderburn (Miss E. Gray), Bendigo (Mrs. W. Eskdale), Barfold (Miss E. Romanis), Harcourt (J. Stewart), Elmore (A. Vroland), Prairie (W. H. Thomas), Ballendella (Miss L. Rake), Shepparton (E. Adams, K. Christie), Arcadia, Numurkah, Waaia, Katunga, Wunghnu (Miss Evans, Miss Yeo), Yielima (D. Campbell), Strathmerton (F. Patterson), Longwood (H. C. Hare, T. Lewis), Benalla (Misses Stewart), Glenrowan (M. P. Brennan), Tatong (D. Coghill), Miepoll (Miss O. Farrell), Baulkamaugh North, Cosgrove South (Miss Berry), Healesville, Grantville (W. P. Thomas), Bunyip (Mrs. A'Beckett), Moe (C. J. Baker), and Sale (Miss M'Kennon).

Many of the contributions mentioned were forwarded by teachers or pupils of State schools through the instrumentality of Dr. Leach, organizing inspector of nature study, who specially requested exhibits from likely localities.

The more noteworthy and attractive specimens in a collection of about 45 blooms of Australian plants from the Melbourne Botanic Gardens were:—*Acacia saligna*, Golden Wreath Wattle, *Bauera rubioides* and its white variety, Wire Bauera, *Brachysema lanceolatum*, Red Pea-flower Bush, *Calythrix Sullivani*, Grampian Fringe Myrtle, *Clematis aristata*, var. *Dennisæ*, Pink-flowered Virgin's Bower, *Chorizema cordatum*, Heart-leaved Flame Pea-bush, *Chorizema ilicifolium*, Holly-leaved Flame Pea-bush, *Doryanthes Palmeri*, Palmer's Spear Lily, *Elæocarpus cyaneus*, Blue Olive Berry-tree, *Erythrina indica*, Coral-tree, *Eriostemon myoporoides*, Long-leaved Wax Flower, *Epacris longiflora*, Long-flowered Australian Heath, *Olearia stellulata*, var. *lirata*, Ridge Snow-Bush, *Prostanthera Sieberi*, Sieber's Mint-bush, *Telopea speciosissima*, New South Wales Waratah, *Verticordia Fontanesii*, Juniper Myrtle, *Epacris pulchella*, Pretty-flowered Australian Heath, *Tetratheca ciliata*, Pink Eyes, *Brachysema lanceolata*, Red Pea-flower Bush; also the orchids *Cymbidium albuciflorum*, Albuca-flowered Cymbidium, and *Dendrobium teretifolium*, Pencil Orchid.

A supply of Waratahs and other local flowers was kindly sent by Mr. R. T. Baker, F.L.S., of the Technological Museum, Sydney, which proved a valuable asset for the auction sale with which the show terminated.

Several members of the Club, among whom were Miss J. Raft, M.Sc., Miss Crooke, Dr. Kauffman, Mr. A. D. Hardy, F.L.S., Mr. F. Chapman, A.L.S., and Mr. J. Searle, exhibited

botanical preparations under microscopes, which proved of great interest. Other ladies, under Mrs. Coghill and Mrs. Edmondson, made up button-holes and bouquets of surplus flowers, which found a ready sale among the visitors.

During the evening two lecturettes, illustrated by lantern slides, were given in the upper hall—the first by Mr. E. E. Pescott, F.L.S., on "The Wild-Flowers of Victoria," and the second by Mr. J. A. Kershaw, F.E.S., on "The Scenery of the National Park, Wilson's Promontory." Each proved of great interest, and was the means of exciting further wonder at the richness of our Victorian flora.

Though rather late for acacias, still some twenty species of this genus were exhibited, and made a fine group in the centre of the hall. The beautiful *Swainsona procumbens* was prominent among many collections from the Northern plains, and excited general admiration, also inquiries as to whether it could be cultivated, but at present it seems to be intractable.

The following are some of the exhibits made by members :—

By Messrs. J. W. Audas, F.L.S., and K. Glance.—About 35 species from Mount Dandenong and Olinda, including *Grevillea alpina*, *Pultenæa scabra*, *Pittosporum bicolor*, *Zieria Smithii*, *Indigofera australis*, *Acacia stricta*, *Goodia lotifolia*, *Stackhousia linarifolia*, and *Pimelea axiflora*.

By Messrs. F. G. A. Barnard and D. J. Paton.—About 20 species from Bendigo, including *Boronia polygalifolia*, *Eriostemon obovalis*, *Prostanthera hirtula*, *Loudonia Behrii*, *Bæckea diffusa*, *Eutaxia empetrifolia*, *Pultenæa pedunculata*, *Thryptomene ciliata*, *Sphærolobium Daviesioides*, *Acacia retinoides*, *A. montana*, and Mallee, *Eucalyptus uncinata* (in bud).

By Mr. G. Coghill. — About 40 species from Gellibrand (Otway Forest), including *Epacris lanuginosa*, *Melaleuca squamea*, *Plagianthus pulchellus*, and the orchid *Acianthus caudatus*.

By Messrs. E. E. Pescott, F.L.S., and C. French, jun. — Collection of 34 species of Victorian orchids from various parts of the State, including nine species of Caladenia, *C. leptochila* being new for Victoria ; six species of Thelymitra ; five species of Diuris, *D. palachila* being new for Victoria ; and ten species of Pterostylis, among which were *P. cygnocephala*, *P. alpina*, and *P. barbata*. The following species were exhibited growing in pots :—*Thelymitra carnea*, *Diuris pedunculata*, *Prasophyllum elatum*, *Acianthus caudatus*, *Pterostylis curta*, *P. barbata*, *Caladenia dilatata*, *C. Cairnsiana*, and *C. Patersoni*.

By Dr. Sutton and Mr. P. R. H. St. John. —About 30 species from the Brisbane Range, Bacchus Marsh district, including *Boronia anemonifolia*, *Bossiæa microphylla*, *Acacia aspera*, *A. acinacea*, *Prostanthera denticulata*, *Grevillea aquifolium*, *G.*

floribunda, *Lysanthe* (*Styphelia*) *strigosa*, *Pseudanthus divaricatissimus*, *Olearia* (*Aster*) *pimeleoides*, *Bæckea diffusa*, *Tetratheca ciliata*, and *T. ericinum*.

By Mr. J. R. Tovey.—About 45 species from Cheltenham and Mentone, including *Leptospermum myrsinoides*, *Burchardia umbellata*, *Dillwynia cinerascens*, *Ricinocarpus pinifolius*, *Correa speciosa*, and *Pimelea curviflora*.

At the close of the exhibition many of the flowers were sold by auction by Mr. A. E. Haughton, of Coghill and Haughton, thus adding about £3 to the net profit, which will probably amount to £55 when the account is finally closed.

Wild-flowers.—The Kew Horticultural Society, at its recent show, offered special prizes for exhibits of wild-flowers. Three members of the F.N. Club—Miss Nethercote, Mr. C. French, and Mr. F. G. A. Barnard—were among the exhibitors, but were not successful in obtaining a place on the prize list. The prizes were taken by collections from the Doncaster district, which, though attractive, lacked the completeness of two of the other exhibits. Quite a number of specimens of the Bearded Orchid, *Calochilus Robertsoni*, were included in the collections. A representative collection of Grampian flowers was also on exhibition. These were obtained from Mr. J. D'Alton, of Hall's Gap, and were greatly admired.

Ballarat Wild-flower Show.—An exhibition of wild-flowers was held at the School of Mines, Ballarat, on Saturday, 16th October. It was organized to help the Red Cross Fund, and succeeded in creating a considerable amount of interest. Mr. H. B. Williamson, who was the prime mover in the affair, secured some very fine exhibits from his teacher friends in various parts of the State, and the report of the show in the *Ballarat Star* records a large number of our most interesting flowers as having been on exhibition. There, as in Melbourne, the Trailing Swainsona, *S. procumbens*, from the Northern plains, with its large lavender-coloured, pea-shaped flowers, attracted much attention, it resembling so much the favourite flower of our gardens, the sweet pea; but unfortunately its success as a garden flower cannot be guaranteed. More must be learned of its requirements as to soil and treatment.

"Another day Rosie heard a slipping along the outside of the limb, as if something were coming very slyly along. 'It must be the old goanna,' she said. 'The tree-swallow called in yesterday, and told me he was about and would be after eggs. I'll catch him.' She left the eggs and quietly edged near the hole. Soon the owner of a flat head and two beady eyes peered in." From "Stories from Nature."

PICRIC ACID AND GRASS-TREE GUM.

By R. A. KEBLE.

(*Read before the Field Naturalists' Club of Victoria, 9th Aug.*, 1915.)

ANYTHING that connects Australian natural products with the war must be a subject of active interest to naturalists. The scientific committee recently formed in England, with representatives in every part of the Empire, brings home to us the stern reality that this is a scientific war; that everything relating to the problems awaiting solution has to be passed through the melting-pot of criticism and investigated, lest something of vital consequence may have been missed or disregarded in the commonplace of routine.

A commodity that has been the object of no little inquiry is picric acid. At one time essentially a dye, its output and value were almost entirely regulated by the demands of the dye industry. Its adoption by the French as a basis of melenite (Eugene Turpin), and at a later date by Great Britain, Germany, Austria, Italy, Spain, and other nations as lyddite, ecrasite, thorite, &c., &c., has enhanced its importance.

Picric acid—trinitrophenol, $C_6H_2(NO_2)_3OH$, is the final product of the action of nitric acid on a large number of substances containing a benzene nucleus. It was formerly prepared by the direct action of nitric acid on phenol, but it is now made by dissolving the phenol in strong sulphuric acid and then acting on the resulting phenol-sulphonic acid with excess of nitric acid. Picric acid separates from the acid mixture as an oily liquid, which solidifies on cooling. It is purified by recrystallization from water.* This process is carried out on a large scale in the coal-tar dye industry, from whence comes the bulk of our supplies.* It is, however, also obtainable from indigo, aloes, and gum resins, and it is the last-named source that has occasioned these and other inquiries.

The resin of the liliaceous tree, Xanthorrhœa, has long been known as acaroid resin—a yellow, fragrant, organic compound, soluble in alcohol, ether, and caustic potash. The potash solution, heated with HCl, deposits benzoic acid and cinnamic acid; nitric acid oxidizes it to picric acid: it yields, on distillation, small quantities of benzene and styrene, and by potash fusion it gives *p.* oxy-benzoic acid, resorcin, and pyrocatechin.† In a note on the genus Xanthorrhœa, Baron von Mueller,‡ writing on *X. Tatei*, states that the resin "is in demand for incense, for particular sorts of varnishes, for the manufacture of sealing wax . . . . and for picric acid,

* See Appendix, No. 1, p. 573.
† See Appendix, No. 2.
‡ See Appendix, No. 3, p. 580.

which it yields in large percentage." Maiden* states that grass-tree gum has a very small demand—at most 4d. or 6d. a pound retail, and wholesale much less. "It is chiefly used," he writes, "as a colouring for varnishes. . . . It has been observed that there is an abundance of picric acid—a very powerful yellow dye; but this substance can be so cheaply made from coal tar that the resin is not now thought of for the purpose. . . ."

It is somewhat curious, however, that this commodity should have been the subject of inquiry for some time previous to the inception of the war. Companies have been formed to gather it, and it is reputed to have been the source of considerable income to the inhabitants of Kangaroo Island and elsewhere. The demand for it, too, seems to have arisen in the enemy's country. We are, perhaps, right in assuming that the German buyers had an entirely peaceable purpose in view: for though some of its uses have been given, many others have been omitted. Germans have made the investigation of such products peculiarly their own, a consequence, no doubt, of their specialization in aniline dyes. The wide range of their research, coupled with our knowledge of their long preparation for war, should, however, cause us to pause before relegating to obscurity such a seemingly unimportant commodity. Many of the operations in the manufacture of explosives for war purposes are more or less enveloped in secrecy—a fact that militates against our obtaining a certain knowledge of its processes and purposes. Moreover, there is as little desire on our part to know the secrets of our own explosive factories as there is a keen desire to know those of the enemy. Acaroid resin may possibly have passed from the category of useful explosive products, but the facts remain that it is a source of picric acid; another of its products, pyrocatechin, reacts violently with nitric acid,† and it has been the subject of German inquiry. In view, therefore, of this hypothetical value, it may not be out of place to summarize our knowledge of the grass-tree, more particularly as regards Victoria.

The better known Victorian species are *Xanthorrhœa hastalis*, R. Brown, *X. minor*, R. Brown, and *X. australis*, R. Brown. All these species appear to prefer a sandy soil, and are found in profusion on the coastal plains almost anywhere between the South Australian border and Cape Howe. A few isolated patches occur inland, such as those between Nhill and Apsley, and on the Strathbogie Ranges.

The better-known Australian species, with their local names and distribution, are given below. The list has been compiled from various sources ‡:—

* See Appendix, No. 4, p. 232. † See Appendix, No. 2.
‡ See Appendix, Nos. 5 and 6, &c.

Species.	Local Name.	Distribution.
Xanthorrhœa arborea, R. Brown	.. Mountain Grass-tree	.. N.S.W.
	Acaroid Resin Plant	.. Qld.
	Great Resin Grass-tree	
	Dackowar	
X. australis, R. Brown	.. Victorian Grass-tree	.. Vic.
	Tasmanian Yellow Resin Tree	.. Tas.
	Southern Grass-tree	
X. Fraseri, R. Brown	.. Fraser's Grass-tree	.. W.A.
X. hastalis, R. Brown	.. Spear Grass-tree ..	.. Vic.
	Australian Grass-tree	.. N.S.W.
	Australian Resin-tree	.. Qld.
	Goona-ngulla	
X. minor, R. Brown ..	.. Dwarf Grass-tree ..	.. Vic., N.S.W.,
	Bayonet Grass	S.A., Tas.
	Small Grass-tree	
X. Tateana, F. v. Mueller	.. Tate's Grass-tree ..	.. S.A.

There is little information to be obtained as to the amount, quality, or individual advantages of the gum from the various species. Very little analytical work seems to have been done either in Australia or in Germany.

The usual method of collecting gum is as follows:—The articles required are an axe, sieve, flail, and sheet. The stems of the grass-trees are hacked down, broken into convenient pieces, and allowed to fall on to the sheet. A stout stick or flail completes the work of disintegration. The substance is then passed through a sieve, the ligneous portions failing to pass through the meshes. A gentle breeze is sufficient to winnow that which has passed through the sieve.*

The Legislative Assembly of Western Australia has recently passed a bill authorizing an agreement whereby the Black-boy or Zamia Palm, *Macrozamia Fraseri*, Miquelli, may be removed from Crown lands † for its gum and other products.

If picric acid is still of primary importance (there is a general statement that trinitrotoluene is replacing it), it seems inconceivable that any inconvenience that may have been caused in the first days of the war by the shutting out of supplies from Germany would not have been speedily remedied. Coal tar is distilled in considerable quantity from plants in all the larger towns throughout the Empire, and the supply should be adequate for all requirements. The development of the coal tar industry, with that mighty adjunct, the extraction of its by-products, is, however, a sad chapter in the history of British enterprise—one that must before long be reviewed, disagreeable as that task may be. Until this has been done, and the industry firmly re-established, grass-tree gum may

* See Appendix, No. 4.
† See Appendix, No. 7.

serve as a temporary expedient—one that is easily obtained, though perhaps expensive, and readily treated. The purpose of this note will have been achieved if it gives a terse but complete summary of the facts relating to grass-tree gum, for the information of those whose onerous duties are to provide munitions for the successful prosecution of the war.

APPENDIX.

1. MARSHALL, ARTHUR—Explosives: their Manufacture, Properties, Tests, and History. 1915.
2. MORLEY and MUIR—Watt's Dictionary of Chemistry, vol. i.
3. VON MUELLER, F.—Select Extra-Tropical Plants. 1895.
4. MAIDEN, J. H.—Useful Native Plants of Australia.
5. PLANT NAMES COMMITTEE.—Vernacular Names of Victorian Plants. *Journal of Agriculture*, Victoria vol. ix., 1911.
6. GUILFOYLE, W.—Australian Plants.
7. *Chemist and Druggist* Supplement, 10th April, 1915.

A BLIND BOTANIST.—Mr. J. R. Murdoch, of Parkville, forwards a cutting from the *Leeds* (Eng.) *Mercury* for 21st May, announcing that the Leeds University is about to confer the honorary degree of Master of Science on Mr. J. G. Wilkinson, of Leeds, familiarly known as the blind botanist. Mr. Wilkinson, who is now in his sixtieth year, lost his sight as the result of a severe illness nearly forty years ago: but, inheriting a love of plants from his mother, he has triumphed over his misfortune, and has come to be recognized as a leading authority on plants and trees. He has learned by touch or taste to distinguish all the plants of the neighbourhood, and even with foreign species, if unknown to him, can generally give some idea of their systematic position, and when given the name is ready with many details as to habits, uses, &c. Both Mr. Wilkinson and his mother were personally known to Mr. Murdoch when living in Leeds some years ago.

"STORIES FROM NATURE."—An excellent little volume, very suitable as a reader for schools, has been recently published by Macmillan and Co., London, under the title of "Stories from Nature." Its author (Miss) J. A. Fletcher, of Tasmania, is to be congratulated on the happy way in which she has introduced natural history facts into her tales, and created an interest in her stories. The volume contains some thirty illustrations, which have the merit of being photographs from nature, many of them of nests and eggs of familiar birds. It is cloth bound, and the price is one shilling and ninepence.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 8th November, 1915.

The president, Dr. C. S. Sutton, occupied the chair, and about thirty-six members and visitors were present.

REPORTS.

In the absence of the leader (Mr. H. Witty), Mr. F. G. A. Barnard made a brief report of the excursion to Gembrook on 16th–17th October, which, he said, had proved very enjoyable, though slightly marred by showery weather. The party was greatly indebted to Mr. and Mrs. M'Innes, who placed a cottage at their disposal during the stay. Wild-flowers were fairly plentiful, but the striking feature of the trip was the splendid tints displayed by the young growth of the various gum saplings, which in themselves were worth the journey from town. The district is a good one from both the botanist's and ornithologist's point of view, and, he hoped, would be visited by a larger party at no distant date. In conclusion, he moved that a letter of thanks be sent to Mr. and Mrs. M'Innes for their hospitality on the occasion.

The motion was seconded by Mr. F. Wisewould and carried.

A report of the excursion to the You Yangs on Saturday, 30th October, was made by the leader, Mr. A. D. Hardy, F.L.S., who stated that eight members participated in the outing. The journey from the Little River railway station to the hills, a distance of about four miles, was negotiated against a very strong and variable wind. The wattle plantation to the south-east of the mount was first inspected, and then the ascent made to Flinders Peak, 1,154 feet above sea-level. Here some little time was spent resting and viewing the surrounding landscape. On descending, the party bore westerly, and entered the eucalyptus plantation, where they had an opportunity of contrasting the long, straight, robust bole of the Blue Gums planted by the Forest Department with the low and gnarled trunk of the species as growing endemic on the peak. The flora of the reserve is not extensive, the Snowy Mint-bush, *Prostanthera nivea*, being the most attractive species. The Sweet Tobacco, *Nicotiana suaveolens*, was well in bloom, as well as numerous species of everlastings. The party returned from Lara station, the distance travelled being about ten miles.

A report of the excursion to Nyora on Cup Day, Tuesday, 2nd November, was made by the leader, Mr. P. R. H. St. John, who said that the outing was poorly attended. The weather was all that could be desired, and the flora of the locality was at the height of perfection. During the day 167 species of wild-flowers, &c., were noted, and, with the expenditure of a little more time and care, this total could easily have been increased. The most conspicuous and brilliant of the flowering plants met with was *Dampiera stricta*. Mr. J. Searle, who formed one of the party, devoted his attention to an investigation of the micro-fauna of the various water-holes that were met with in the railway reserve and adjacent properties. In detailing the results of his investigations, Mr. J. Searle said that, owing to the recent rains, water was lying in every depression, so that at times it was difficult to determine whether one was investigating permanent swamps or merely surface water that had not yet had time to get away. In some of the permanent pools, notwithstanding the recent dilution of their contents, life was very plentiful, whilst many of the newly-filled depressions contained the nauplius and larval forms of many species of pond animals. The most numerous species of copepod taken was *Brunella longicornis*, Searle, which appeared to be the sole inhabitant of several pools, and was present in nearly every pool tried. Search was made for that very striking species, *Boeckella nyoraensis*, originally described from this district, and not since found elsewhere, but only six or seven specimens were secured. It was described and figured in the *Naturalist* for February, 1912 (xxviii., p. 106) and seems to be a rare and very local species. In addition to these, *Brunella australis*, Searle, *Hemiboeckella scarli*, G. O. Sars, and *Cyclops albidus* were taken. Mosquito larvæ were numerous in all the pools, and swarms of the mature insects, Culex and Stegomyia, took from our party a heavy toll in blood and left our hands, necks, and faces covered with red and white swellings. Another larva belonging to the Culicidæ, probably that of the little-known genus Mochlonyx, was very plentiful. They have a pair of air sacs at either end of the body, which enable them to remain under water in a horizontal position for a very great length of time. Live specimens of all species mentioned were on exhibition.

ELECTION OF MEMBERS.

On a ballot being taken, Miss Howard, Methodist Ladies' College, Hawthorn; Miss Myrtle T. Johnson, 316 Bridge-road, Richmond; Miss Aldyth B. Longmore, 184 Bourke-street, Melbourne; Miss O. Wolfe, Bruce-street, Toorak; Mrs. M. C. Miller, "Moyston," Burke-road, Melbourne; Mrs. Winspur, 14 Cambridge-street, Camberwell; Mr. Francis Keep, "Mount-

field," Canterbury; Dr. F. Hamilton Kenny, Naval Depot, Williamstown; Mr. R. E. Luher, 63 Patterson-street, Princes' Hill, North Carlton; and Mr. Otto Römcke, "Norway," Woodstock-street, Canterbury, were duly elected as ordinary members of the Club.

PAPERS READ.

1. By Mr. A. D. Hardy, F.L.S., entitled "The Forests of Victoria," Part II.

The author gave a considerable amount of interesting and instructive information bearing on the principal industries connected with the forests, and by means of a large series of lantern slides showed the many phases undergone by the giant gum, from the first stroke of the feller's axe at its base till it was converted into marketable and portable products by the circular saw, broad axe, paling knife, or retort. The saw-milling, splitting, and hewing industries were dealt with, and the quantity and value of the timber cut in several of our State forests furnished. The oil production, chemical extraction, wood-seasoning, bark, and apiculture, &c., were in turn considered, and views of each portrayed.

The president, in complimenting Mr. Hardy on the educational value of his paper, asked if it were the custom of paling splitters to go into a forest and sample a number of trees before selecting one? What was their mode of procedure in determining whether a tree was suitable for their purpose or otherwise, and did the trees they tried sustain any injury?

Mr. J. Gabriel explained the mode adopted by splitters in making a selection of a tree, and said he agreed with the lecturer that a lack of firewood would be a serious matter in the near future. No adequate provision was being made for future generations. Replanting should be more extensively carried on by the Government.

Mr. F. Wisewould remarked that in his opinion the present scarcity of firewood was induced by the public demand for two classes of timber—Red Gum and Box. Much of the valuable timber now being burnt in large quantities by the landowners of the State would be split and made available for domestic use but for this preference.

The president said he concurred with Mr. Gabriel respecting the afforestation of denuded areas, and reminded him that there was a Forest League in existence whose main object was to induce the Government of the day to reafforest extensively, and thereby make provision for future needs. The League could undoubtedly do more with a greater membership.

Mr. Hardy, in reply, detailed the conditions under which splitters were permitted to select growing timber for splitting.

The Forest Department were seized with the necessity of making provision for the future, and, so far as funds would permit, were doing what they could. Some idea might be gleaned of the work being done to reafforest and preserve the timber in the reserves when it was stated that nearly 500,000 seedlings were planted in one year, and that gangs of men were at work in various parts of the State making fire-breaks. The policy of the Department was: the more funds the greater the planting, and the greater the provision for the preservation of trees already in existence.

2. By Mr. F. Chapman, A.L.S., entitled "On Some Smaller Fossils from the Red Limestone at Grange Burn, near Hamilton, with a Note on a New Species of *Bolivina*."

The author illustrated his remarks by a series of lantern slides showing the scenery of the locality, sections of the principal cliff exposures, and photographs and sketches of the fossils constituting this special limestone fauna, and stated that the limestone was proved to occupy an intermediate position between the upper and lower Muddy Creek beds, and, by containing restricted Batesfordian fossils, naturally fell into the Janjukian series of the phase shown in the hard polyzoal rock of the Geelong area. Reference was made to the useful aid given to the author by the late Lieut. E. E. Henty, of "The Caves," who had lost his life in the present war, and after whom he had named the new species of *Bolivina* as *B. hentyana*.

EXHIBITS.

By Mr F. Chapman, A.L.S.—New species of Bolivina, *Bolivina hentyana*, Chapman, from Tertiary (Janjukian), Grange Burn, Hamilton.

By Mr. J. E. Dixon.—Scale insects—*Eriococcus serratilobis*, n. sp., *Chionaspis frenchi*, n. sp., *Aspidiotus tasmaniæ*, n. sp., *Aspidiotus bidens*, n. sp., *Pulvinaria maskelli*, n. var., *articulata*, from the Mallee.

By Mr. C. French, jun.—Scale insects—*Mytilaspis beyeriæ*, n. sp., *Aspidiotus victoriæ*, n. sp., from the Mallee; *Eriococcus sordidus*, n. sp., from Dandenong Ranges; *Rhizococcus lecanoides*, n. sp., from Cheltenham.

By Mr. A. D. Hardy, F.L.S. Spider's web, showing about 200 small insects meshed during one night.

By Miss G. Nethercote. Flowering specimens of *Prostanthera nivea*, Cunn., Snowy Mint-bush, collected 30 to 15, You Yangs; also *Hibbertia procumbens*, *Myosotis australis*, *Stackhousia linarifolia*, *Utricularia dichotoma*, *Microtis porrifolia*, *Wahlenbergia gracilis*, and *Leptorrhynchos squamatus*, from various localities.

By Mr. D. J. Paton.—Flowering specimens of *Eriostemon* (*Phebalium*) *pungens*, Bent., Prickly Phebalium, *Loudonia Behrii*, Sch., Golden Pennants, *Cheiranthera linearis*, Cunn., Finger Flower, *Melaleuca decussata*, R. Br., *Melaleuca Wilsoni*, R. Brown, *Goodenia amplexans*, F. v. M., *Astrotricha ledifolia*, Cand., &c., from the Whipstick Forest, Bendigo.

By Mr. F. Pitcher.—*Acacia penninervis*, Sieb., Hickory Wattle, now flowering in the Botanic Gardens; *Tetratheca ciliata*, Variable Pinkeyes, from Marysville.

By Mr. P. R. H. St. John.—Herbarium specimens of *Aphelia gracilis*, Sond., and *Aphelia pumilio*, F. v. M., collected 2/10/15, Doreen district; *Hibbertia procumbens*, Bennett, Spreading Guinea-Flower, *Myosotis australis*, R. Brown, *Pomaderris vaccinifolia*, Reiss., *Stylidium despectum*, R. Brown, Small Stylewort, *Utricularia lateriflora*, R. Brown, Small Bladderwort, collected 2/11/15, at Nyora.

By Dr. C. S. Sutton and Mr. P. R. H. St. John.—*Geococcus pusillus*, Drmd., Earth Cress, collected 25/9/15, between Melton and Parwan: *Levenhookia dubia*, Sond., Hairy Stylewort, *Levenhookia Sonderi*, F. v. M., Slender Stylewort, collected 9/10/15, Doreen district.

After the usual conversazione the meeting terminated.

Exhibition of Wild-flowers.—The accounts of the recent exhibition of wild-flowers have now been finally closed, and members of the Field Naturalists' Club will be pleased to learn that by their efforts the sum of £54 4s. 11d. has been added to the Wounded Soldiers' Fund. As the total receipts were £72 8s. 6d., and the expenses £18 3s. 7d., the resulting profit was just three times the expenditure. There are still some corrections and acknowledgments to make in connection with the report of the exhibition in the last *Naturalist*. The flowers received from Sydney were inadvertently credited to Mr. R. T. Baker, F.L.S., instead of Mr. J. H. Maiden, F.L.S., Government Botanist, and Mrs. D'Alton, Hall's Gap, should have been mentioned as a sender of Grampian flowers. Thanks are due also to Mrs. A. D. Hardy, who undertook the supplying of refreshments during the afternoon, to the ladies and others helping in various ways, and to the Misses M. Muntz, E. M'Adam, F. Bainbridge, H. Ball, A. Sutton, and S. Sutton for their kindness in acting as flower-sellers, by which the receipts were materially assisted.

THE FORESTS OF VICTORIA.

PART II.*

By A. D. HARDY, F.L.S., Forests Department.

(*Read before the Field Naturalists' Club of Victoria, 8th Nov.*, 1915.)

IV.—DESTRUCTIVE AGENCIES.

Of the animals that menace the forest, the following come readily to mind:—Man, cattle, sheep, rabbits, hares, birds, insects, termites, and scale insects, while the vegetable section includes the parasites Loranthus and Cassytha, respectively known as Mistletoe and Dodder-Laurel; the weeds St. John's Wort, thistles, &c., bracken, and fungi; and also the lower story scrub plants, such as Cassinia, Helichrysum, and the Blackberry (Rubus). The meteorological contribution includes electrical storms, violent winds, and drought. Of the animals—man, legitimately in economic exploitation, and wrongfully with fire and ringbarking axe; cattle, in interference with stream sources, the treading of seedlings, and introduction of alien plants: sheep, in eating of seedlings and distribution of weeds: rabbits, and probably hares, in destruction of seedlings and barking of saplings in drought time: birds (several species), as carriers of mistletoe seeds, destruction of insectivorous birds (by hawks, Butcher-birds, &c.), destruction of eucalypt seeds, and destruction of useful insects such as the bee (by Bee-eater and Wood-Swallow); and insects, in over-consumption of pollen, gall-forming, timber-boring, and defoliation. Wallabies and kangaroos have been accused of eating seedlings and gnawing bark of young saplings, but the damage is comparatively insignificant, and is mostly during drought; yet they are to be reckoned with when dealing with forest grasses. The protected Koala and 'Possum do little harm, but the former, always plentiful in the National Park at Wilson's Promontory, and there doubly protected, is, I am told, so stripping the eucalypts at their favourite haunt (Fraser's Creek) that they may kill their source of nutriment.

Among insects, beetles—chiefly of the longicorn family—are the worst, the larvæ of the latter riddling the tree-trunks to a great height, the most destructive being the triangular-marked Banksia Beetle, the Banksia Borer, the Steel-blue Sheoak Borer, Masters's Gum Borer, the Apple Gum Bimia, and the Yellow Box Borer. Add to these various weevils, cockchafers, &c., and there is a formidable list of destroyers, presenting a problem for the forest entomologist of the future. One of these beetles, the cockchafer, has ground grubs, though the adult form feeds on the leaves of the trees. In all the others the larvæ attack the timber, living in the trees sometimes, as Mr. French has pointed out, for years. Several moths must be included

* For Part I. see *Victorian Naturalist*, September, 1915, p. 69.

amongst the insects destructive to forests. The Wattle Goat-Moth larvæ destroy great quantities of the valuable tanning wattles, *Acacia mollissima* and *A. pycnantha*; but in plantations grown for bark the stripping is chiefly done before the trees are attacked. The Gum Emperor Moth, a favourite subject for nature-study in the schools, has a large, brilliantly-coloured caterpillar, which feeds indifferently on the native eucalypts or the introduced Peruvian "Pepper-tree," *Schinus molle*. Two moths which, to the "unseeing eye," are so similar, and whose larvæ are much alike, while so different from others that one wonders why one genera could not include both, are the Cup-moths. Their pretty little larvæ, coloured like small Persian mats, adhere to the leaves by their viscid undersides, without legs or prolegs, and can strip a sapling in very short time. They are known as the Painted Cup-Moth, *Limacodes longerans*, and the Mottled Cup-Moth, *Doratifera vulnerans*. The larvæ are further characterized by "fore and aft" sets of small defensive spines, four rosettes in each set, and which, if touched, impart a smarting pain.

But of all the forest pests the most repulsive creatures are the sociable larvæ of the Gum Saw-Fly, *Perga dorsalis*, which has a serrated or notched apparatus wherewith to make cuts in bark for the deposit of eggs. The larvæ are often seen massed in bunches on twigs of eucalypt saplings—dark, ugly, and hairy—flicking their "tails," which have no prolegs, and emitting a malodorous liquid when disturbed. A colony of these social larvæ can strip a sapling in a few days.

In certain localities the depredations of "white ants" are severe, and, like the work of beetles, often concealed, to the chagrin of saw-miller and forester, who then find a fair-looking forest of barely mature timber comparatively worthless, the trees, like medlars, being "fair without and rotten within." So long as the mechanical stress in the tree is not reduced to the breaking-point, the removal of the heart-wood by "ants" and fungi does not imperil the life of the tree or its appearance for some years. "White ants" are not true ants, and are properly known as "termites" (Termes, sp.)

Scale insects do considerable damage to twigs and foliage. They form a group known as Coccids, and the Coccidæ form a branch of study requiring a specialist. Our member, Mr. Charles French, jun., as Government Entomologist, has devoted considerable attention to this group. Wattles are often attacked by both borers and scale at the same time, and I have seen many fine Black Wattles so destroyed. Then there is a gall-fly that converts the buds of eucalypts—especially *E. rostrata*—into clusters of malformations, swollen as large as small cherries, which, by reason of weight, cause breakage of

branchlets. I have seen, in the Northern districts—*e.g.*, Heathcote—the roads littered with the small branches bearing these galls. Although the tree as a whole is not affected seriously, there is caused a considerable shortage in the supply of pollen and honey for the apiaries.

Of meteorological agencies, we have wind erosion and dune formation, to the detriment of forest growth along the coast. (Of prospective inland danger from this cause I shall have something to say when referring to climate.) Electrical summer storms are the occasional cause of fires, it is almost certain; and we have evidence of the shattering of large timber trees by lightning. There is also the local effect of storms resembling tornadoes, which have at times cleared a path through a dense forest and reduced solid trunks to kindling wood. I recently exhibited at a F.N.C. meeting a soft mass of tangled wood-fibre which had resulted from the spiral wrenching of a eucalyptus tree from its base near the root.

V.—Protection and Improvement.

We may take it for granted that before the advent of the white man, agencies of destruction, restoration, and protection were in fair equilibrium. Insect pests and vegetable parasites abounded, the former being held in check by birds. The aboriginals—who kept to the open plateaus, the savannahs, the coastal dunes and river flats for hunting and fishing, and avoided fearfully the mountain forests—were probably instrumental in causing lowland forest fires, which incidentally destroyed insects, together with snakes and creatures of beneficent character, such as insectivorous birds, other reptiles, small marsupials, and bats. Insect eaters, such as the Goanna, the Blue-tongued Lizard, the Frilled, and smaller lizards, suffer greatly in forest fires, while the larval forms of many species of insects have subterranean safety. The first-named, though an arrant egg-thief and eater of nestling birds, devours much forest vermin, and to-day is, like the snake, an enemy of the rabbit, which is a desideratum at other than war times. In the humid forests the porcupine, Echidna, is the only animal that I know which, by burrowing, can get at the timber-eating termites. The insectivorous bandicoot unearths much hidden larvæ; the Black Cockatoo rips the bark of the Messmate and Stringybark trees and destroys countless grubs of Masters's Gum Borer; Black Jays discover their lurking insect prey under the loose bark of the decorticating eucalypts and amongst the ground litter of the forest. Myriads of smaller birds—wrens, robins, tits, honey-eaters, tree-runners, tree-creepers, and the like—help in preserving the forest, but are diminishing in numbers before the increasing pea-rifle and shot-gun in the hands of boys and "sports."

Among the larger feathered police of the woods are the Lyre-bird, Crow, Owl, Owlet Nightjar, Mopoke, Magpie, Kookaburra, Grallina, Coachwhip-bird, Harmonious Thrush, Kestrel—often mistaken for the Sparrow-Hawk—and Cuckoo. Before the introduction of European bees, several native species, *Nomia metallica*, &c., small beetles, brush-tongued parrots and other honey-eaters, were pollinating agents. These remain, but innumerable swarms of domestic bees, farmed and wild, assist in transferring the pollen of the forest trees. Other useful insects are the ichneumon flies, dragon-flies, mantis, wasps, hornets — all accounting for much creeping, crawling, and saltatorial vermin. In passing may be mentioned an unconscious insecticide—the ascomycetous fungus *Cordyceps Taylori*, known by the vernacular first applied to a New Zealand congener—"Vegetable Caterpillar"—and which parasitically does to slow death many terrestrial grubs. Spiders and carnivorous centipedes are also useful.

The stream-side flora is protected, for this, in addition to preventing erosion of the banks, serves the further useful purpose of lessening evaporation and giving shade and shelter to aquatic insectivora, such as platypus and fish, of which the former captures larvæ, &c., on the mud-banks, and the latter secures forms at the bottom, wind-blown insects at the surface, and makes many an aerial capture.

The State Forest Department is, among many other works, busily engaged in improving the North Central forests, which contain principally box and ironbark timber trees. Gangs of men are methodically clearing away *débris*, forming fire-breaks, fencing areas to regulate grazing and exclude rabbits, and destroying the parasitic growth of mistletoe (Loranthus, spp.) The Department is also co-ordinating with the Agricultural Department, and through its Fisheries and Game branch is creating forest sanctuaries, where refuge may be taken by insectivorous birds. Improvement of other forests is also in progress, but a much greater population than Victoria at present possesses will be requisite for the conditions which would make practicable a large scheme of improvement of the virgin forests of the State.

The nurseries at Macedon, Creswick, and Broadford provide a steady output of both hardwood and coniferous plants for the plantations in various parts of the State, among which may be mentioned Frankston, Creswick, Maryborough, Dimboola, French Island, You Yangs, and Broadford—altogether, some 10,000 acres being thus occupied.

Great areas of dense and almost impenetrable forest, innocent of track that man can follow, defy effective patrol. Some day, perhaps, every taxpayer in the country will realize

that he has a share in the forest wealth no less than in any dividend-paying company in which he holds scrip, and will know not only his right but also his duty to make the authorities aware of the commission of offences, deliberate or inadvertent, which come to his knowledge, in doing which he would be protecting his own share.

VI.—Forest Industries.

This is not the place for statistical records, which may be found in the reports of the Department, available on application, but members may be surprised at some of the quantities to which I am about to refer. Briefly, the principal industries are as follows :—

Sawmilling (exclusively hardwoods).—Red Gum on the river flats and on the Western plains, Mountain Ash, Messmate, Stringybark, and less Spotted Gum and Blue Gum, in the mountain forest reserves. The Red Gum is chiefly in demand for paving-blocks and railway sleepers ; the other hardwoods are used in harbour works, sleepers, house construction, bridge decking, fencing, and furniture. During a recent year 64½ million super. feet were sawn, value about £322,000 ; ¾ million super. feet of Red Gum alone was cut by the mills of the Murray and Goulburn River areas.

Paling splitting is an industry that goes, preferably (from the State point of view), hand in hand with the sawmilling, in order that trees unfit for the saw through being "pithed" can be used for palings. Paling splitting is almost confined to the south-eastern portion of the State—*e.g.*, Toolangi, Warburton, Neerim. In one year (1913–14) the total reached 1½ million broad palings, which, placed end to end, would reach from Melbourne to beyond Brisbane. The largest paling tree known was a Neerim giant, a fine example of *Eucalyptus regnans*, which yielded over 10,000. Forest trees are also split for fencing timber, many species, including such white gums as the Manna Gum, being suitable for rails but not for posts, while other species yielding good post timber are not so readily available for rails, and are hewn into railway sleepers. Many damaged trees rejected by the mills are utilized by splitters and hewers. The fence posts and rails cut during the past year would, end to end, reach for 150 miles. The railway sleepers hewn amounted to 359,000, or about 400 miles lineal measurement. One tree, a River Red Gum, recorded by Mr. H. Mackay, Conservator of Forests, yielded 161 sleepers.

The chemical industries are principally those of Messrs. Cuming, Smith and Co., at Warburton, and the eucalyptus oil extraction that is scattered over several districts. At the Warburton chemical works, timber (Mountain Ash) rejected by

the mills is cut and dried in huge sheltered stacks half a mile long, and weighing from 10,000 to 15,000 tons, then turned by means of retorts into charcoal, pyroligneous acid, and gas. The pyroligneous acid is separated into water, acetic acid, wood spirit, tar and creosote oils, &c. Methyl alcohol is produced for the manufacture of formalin, and acetone for cordite.

In the oil industry several species of eucalyptus are used, but chiefly the Narrow-leaved Peppermint, the Broad-leaved Peppermint, Red Ironbark, and Blue Mallee, the chief centres being in the Inglewood, Bendigo, and Trentham districts. Crude eucalyptus oil—which is obtained by steam forced through the leaves in stills—is a complex mixture from which, by further distillation, the chemist extracts the constituents at pleasure. through his knowledge of the various boiling-points. That these constituents have different volatility is easily demonstrated by putting a few drops of an oil on a handkerchief and noticing the pungent, fresh smell and the still strong and aromatic but less pungent stale or after-smell. The species which yields the most does not necessarily yield the best oil. The following and perhaps extreme limits, resulting from many tests, I take from Baker and Smith's work: — *Eucalyptus amygdalina*, 3.4 per cent., or 33 lbs. per 1,000 lbs. leaves; *E. rubida*, .008 per cent., or 1 lb. per 1,000; while the Broad-leaved (Blue-leaf) Peppermint, *E. dives*, reaches 2 per cent., or even 3 per cent., of crude oil.

Two typical seasoning works may be mentioned, one being a State enterprise and the other a private concern. The State seasoning works at Newport were started a few years ago by Mr. Mackay, in order that the Forests Department, aware of the excellent timber available, could guarantee almost unshrinkable flooring-boards of mountain hardwoods for public buildings, the best raw material only being used. The heat of the drying chambers is supplied by steam radiators. The Victorian Hardwoods and Sawmilling Co. carry on their "powellizing" of timber (taken from the forests of the Upper Latrobe and sources of the Little Yarra) at Powelltown, which is reached from Yarra Junction, on the Warburton line, by means of a private narrow-gauge railway of about 10 miles in length. There the timber is sawn and impregnated with a saccharine liquid in which other chemicals are employed, this scheme being to substitute the artificially prepared substance for the sap and protoplasm which, decaying *in situ*, tend to pave the way for bacterial and fungal attacks. The timber treated at the State works is mainly Mountain Ash, Yellow Stringybark, and Blackwood, *Acacia melanoxylon*; at the Powelltown works the chief species used is Mountain Ash, *E. regnans*.

The bark industry is an important one, and destined to expand, since wattle bark is now imported from South Africa from trees grown from Australian seed. There are many State wattle plantations—at Maryborough, Majorca, You Yangs, &c., in Gippsland, in the Portland district, three species—viz., *Acacia pycnantha*, *A. mollissima*, and *A. dealbata*, the Golden, Black, and Silver Wattle respectively—being used. The stripping is done under supervision by tender, and only trees over a certain diameter of stem, varying with the locality, are allowed to be stripped. These wattle plantations are being extended by the Government.

Grazing in the forest reserves is of two sorts. There are the grass lands of the savannah country, where the undergrowth and *débris* has been cleared away or where undergrowth never existed except in negligible quantity, as on the periodically-submerged river flats among the Red Gum timber. Here grazing is regulated with the growth of seedling Red Gums kept in view. The other grazing is that of the hill country and highland forests, where it is advantageous to have cattle tracks and to have the mountain grass, "Wild Oats," *Glyceria dives*, eaten down, but the coincidence of grazing and bush-fires has led to the closing of some reserves against grazing during the summer months, and other reserves, except for starving stock at drought time and sawmill draught bullocks, are closed completely. Forest pounds, which are increasing in number, tend to make the closing effective against poachers.

Last, but not least, among the principal industries is apiculture, and I need only briefly refer to this, as a series of articles appearing in the *Agricultural Journal* is dealing specially with the trees which yield the honey supply. The bees, European species, favour lowland country remote from the coast, the principal eucalypts favoured being Box (Yellow, Grey, Red, White, and Long-leaved), Ironbarks (Red and White), Gums (Blue, Yellow, White, and Red), Messmate, and Red and Brown Stringybarks. Species of Acacia, Banksia, and other but shrubby plants, and even weeds, such as Cape Weed, also supply pollen or nectar, or perhaps both. The honey varies with the species. The coarser kinds, if gathered early, are restored to the bees for their own feed when the honey more valued for human consumption is taken away. Thus, much apiculture is carried on with the aid of such eucalypts as Stringybark (Red and Brown) and Messmate, which yield dark honey. Tea-tree yields honey so viscid that it defies the centrifugal extractors. Most genera of plants are fairly regular in flowering, but eucalypts are distinctly uncertain, and, when regular, have their "on" and "off" years, with resting buds during the latter. The largest honey-producing area is that

which extends from Stawell to Hamilton, and includes the Grampians, the Victoria Valley, and Black Range, where the bees gather from Box (Yellow and Grey), Red Gum, Manna Gum, Swamp Gum, Apple Box, Long-leaved Box, Yellow Gum, and the Red and Brown Stringybarks and Messmate, the continuity of nectar flow and pollen for bee bread being provided by the great number of plants, varied in colour, habit, and time of bloom, for which that district is famous. Victoria's output of honey for the year 1912–13 was about 1,450 tons (3¼ million pounds), valued at £45,000, produced by 800 bee farmers with 40,000 productive hives. As a honey-producing State Victoria ranks second only to New South Wales in the Commonwealth. The trees which provide fodder for the apiaries are often such as are useless for sawmilling or any purpose other than fuel supply, and are too remote for that. The rapidly increasing price of honey is raising the value of forest land for apiculture to as high as that for sawmilling. But it must be remembered that, even so, honey-production is reasonably subordinated to timber-getting, the one product being a luxury for which substitutes can be found, while we are faced with the possibility of a timber famine.

As the eucalypts form the greater part of our useful trees, I purpose adding, as an appendix to this paper, a list of the Victorian species, with their vernacular names, as proposed by the Plant Names Committee of this Club. These have already been published in the *Journal of Agriculture of Victoria* for August last, where the value of each from a timber supply point of view was dealt with. However, as many of the species are exceedingly valuable from their oil-producing and honey-yielding qualities, and others deserve inclusion on account of fencing, firewood, &c., I will add indications which will enable one to see at a glance which are the most valuable species.

VII.—Reforestation.

Given rest from fires, the native hardwood forests perpetuate and even after fires restore themselves. As matured growths are removed, light penetrates more easily, and in an almost incredibly short space of time several straight saplings shoot up to fill the gap. The old trees, if left to decay, make breeding-grounds for boring and other noxious insects and fungi; when falling destroy other growths; and when down litter the ground with *débris* which prevents seedling growth for many years, and makes fuel for ground fires. Against these defects there is, of course, the benefit derived by the soil from the mouldering tree in course of many years, and the advantages gained in conservation of stream flow by the retarding effect of the ground litter on the get-away of rains.

In the Mallee district, where there are no streams, and where

the subterranean supply of water is tapped by an artificial boring system and deep-rooted eucalypts, it may become necessary to plant or allow natural restoration of the eucalyptian cover to prevent wind erosion of the surface, and to make good the inevitable local loss of atmospheric humidity—a loss caused by removal of deep-rooting perennial vegetation, and the substitution of the more xerophytic cereal crops which draw water from the upper stratum in short circuit during only a third of the year. This applies more or less to other dry lands of the State. In the Mallee wind-breaks transverse to the direction of prevailing winds will be necessary.

Reserves of somewhat inferior trees are sprinkled about the Northern and Western parts of the State. These are firewood reserves and reservations for the supply of mining props, laths, and firewood. The early colonists' fences have lived their life, and are crumbling into decay. An enormous quantity of timber will be required for the supply of posts alone, allowing that wire will largely be used in the future instead of rails. Within a quarter of a century, which is less than the time required to grow a eucalypt of splitting proportions, there will be need for fence-posts for lines aggregating over 200,000 miles. The clash of arms seems remote from Australia, but I may point out that the canopy of a forest of even inferior timber affords concealment of troops against aerial warships and similar attacking forces.

Now, where is the timber to come from for our future wants? The city streets and the railways are eating up our Red Gum forests for paving blocks and sleepers, and a sleeper-producing tree cannot be grown in 100 years.* Harbour works, house construction, bridge-making, &c., and the paling demand are straining the resources of the sawing and splitting timber forests, and the increasing demand for poles for telegraphs, telephones, electric light, &c., and piles for piers, jetties, and wharves, are required for new constructions and renewals. The reserves we have may prove, when too late, to be insufficient, but we may, collectively and individually, do our utmost to jealously guard from wanton, careless, or deliberate injury such as we have. Many of the reserves, at present inaccessible, will be subjected to raids when railways open up the country, and for this we must be prepared, for if the highland forest cover is reduced considerably by fire or axe there will be a serious outlook and perhaps ruin for the at present prosperous dwellers on the lowlands. The great heart of Australia—the "dead heart," as sometimes called—is sterile for want of water. If the living, prolific, vegetated parts which produce our timber, wool, cereals, fruit, honey, and dairy produce deteriorate, it will probably be because, in spite of warnings—both public

* Some species—*e.g.*, Messmate and Yellow Stringybark—mature earlier.

and private, official and irresponsible—the people fail to grasp the fact that the inestimable wealth of the forests is as well worth guarding as gold in a strong box, and allow one of the finest State assets to be dissipated. A few officials, however enthusiastic and however well trained and commanded, are of comparatively little avail against the opposing forces unless well backed by a far-seeing and sympathetic public.

The great sources of the world's timber supply are ranked as follows :—Northern Europe and Asia (chiefly the great Russian and Siberian areas), United States, and Canada. Russia's supply is far from exhausted, but is chiefly softwoods. The United States appears to be cutting in excess of the annual increments, while Canada, profiting by the experience of other countries, is conserving her forest wealth, especially in British Columbia : but as much as ten times the amount of the annual increase has been consumed by fire in America in one year, and such wastage must be kept steadily in view as a foe to be provided against and baffled by constant vigilance in Victoria.

APPENDIX.

VICTORIAN SPECIES OF EUCALYPTUS, WITH PRINCIPAL USES.

SYMBOLS : — T = timber ; W = firewood ; O = oil ; H = honey ; F = fencing ; S = shade or shelter ; Ch. = chemicals ; C = climatic and scenic ; P = protection of lowland streams by root-binding of soil.

Vernacular (Provisional).	Botanical Name.	Economic Value.
River Red Gum	*E. rostrata*	T, H, P
Forest Red Gum	*E. tereticornis*	T, H
Blue Gum	*E. globulus*	T, O, H
Spotted Gum	*E. maculata*	T, O
Spotted Blue Gum	*E. Maideni*	T, O
Grey ("Spotted") Gum	*E. goniocalyx*	T, O
Mountain Ash	*E. regnans*	T
Red Mountain Ash	*E. Delegatensis*	T, O
Swamp Gum	*E. paludosa*	T, O, H, W
Manna Gum	*E. viminalis*	T, O, H, P
Peppermint Gum	*E. piperita*	T
Sugar Gum	*E. cladocalyx* (*corynocalyx*)	T, H, S
Blackbutt	*E. pilularis*	T, O
River White Gum	*E. radiata*	O, W, F, P
Black Sallee	*E. stellulata*	C
White Sallee	*E. pauciflora*	H, F, W
Snow Gum	" " (var. *alpina*)	C
Yellow Gum (White Ironbark)	*E. leucoxylon*	T, H, O, W
Pink Gum	*E. fasciculosa*	T, F, W
Candle-bark Gum	*E. rubida*	F
White-top Gum	*E. vitrea*	O
Woollybutt	*E. longifolia*	T, F, O, S
White Brittle Gum	*E. maculosa*	
Sallow Gum	*E. camphora*	T, O
Gully Gum	*E. Smithii*	T, O, W
Shining Gum	*E. nitens*	T, W
Neglected Gum	*E. neglecta*	

Vernacular (Provisional).	Botanical Name.	Economic Value.
Dwart Gum *	*E. Kitsoni*	O, W *
Grampians Gum	*E. alpina*	C
Cider Gum	*E. Gunnii*	T
Apple Gum	*E. Stuartiana*	T, H, W, S
Silver-top Ironbark	*E. Sieberiana*	T, F
Red Ironbark	*E. sideroxylon*	T, O, H
Grey Ironbark	*E. paniculata*	T
Black Box	*E. bicolor*	T, F, H, S
Fuzzy Box	*E. Baueriana*	H
Grey Box	*E. hemiphloia*	T, H, F, W, S
White Box	.. .. (var. *albens*)	T, H, F
Long-leaf Box	*E. elæophora*	H, W, O
Red Box	*E. polyanthemos* ..	T, H, W, O, F, S
Gippsland Box	*E. Bosistoana*	T, H, O, S
Yellow Box	*E. melliodora*	T, H, O, S
Red Stringybark	*E. macrorrhyncha* ..	T, H, F, W
Yellow Stringybark	*E. Muelleriana* ..	T, H, F, W
White Stringybark	*E. Eugenoides*	T, O
Brown Stringybark	*E. capitellata*	T, H, W
Mealy Stringybark	*E. cinerea*	W, O, H
Yertchuk	*E. Consideniana* ..	T, O, F
But But	*E. Bridgesiana* ..	T, W
Narrow-leaf Peppermint ..	*E. amygdalina* ..	T, O, H
Blue-leaf Peppermint ..	*E. dives*	O, H
Scented Peppermint	*E. odorata*	O, H
Mahogany Encalypt	*E. botryoides*	T, S
Bloodwood	*E. corymbosa*	T, F
Messmate	*E. obliqua*	T, O, H, W
Messmate (Brown)	*E. hæmastoma* ..	F, H, O
Slender Mallee	*E. calycogona*	F, O, H, S
Hooked Mallee	*E. uncinata*	F, O, H, S
Giant Mallee	*E. incrassata*	F, O, H, S
Dwarf Mallee	*E. dumosa*	F, O, H, S
Oil Mallee	*E. oleosa*	F, O, S
Bull Mallee	*E. Behriana*	T, O, S, W
Green Mallee	*E. viridis*	O, S
Blue Mallee	*E. polybractea*	O

The "Victorian Handbook" for the recent meeting of the British Association in Australia (August, 1914) contains a very informative article on "Forestry in Victoria," by Mr. H. Mackay, Conservator of Forests, which should be referred to by those interested.

For further information see Annual Reports of the State Forests Department, Victoria, 1909 *et seq.*; Maiden's "Critical Revision of the Genus Eucalyptus" and "Forest Flora of New South Wales"; F. v. Mueller's "Eucalyptographia," "Iconography of Acacias," and "Key to System of Victorian Plants"; Baker and Smith's "Research on the Eucalypts" (oil); Boulnois articles on "The Honey Flora of Victoria" in the *Journal of the Department of Agriculture*, Oct., 1914, *et seq.*; and "Plant Names" in *Journ. Dept. Agric.*, August, 1915.

The following authors may be consulted for detailed information as to birds and insects:—Leach, "An Australian Bird Book"; Campbell, "Nests and Eggs of Australian Birds"; French, "Destructive Insects" (includes also some insectivorous birds) Department of Agriculture; Froggatt, "Australian Insects."

* Sometimes called Gippsland Mallee. The roots and stems are, like those of the North-Western Mallee, used for fuel

The Victorian Naturalist.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 13th December, 1915.

The president, Dr. C. S. Sutton, occupied the chair, and about fifty members and visitors were present.

CORRESPONDENCE.

An acknowledgment was received from the treasurer of the Victorian Red Cross Australian Sick and Wounded Fund for the sum of £54 4s. 11d., proceeds derived from the Wild-Flower Exhibition in the Athenæum Hall on Tuesday, 28th September.

The president said the receipt might be considered to have terminated an undertaking that reflected great credit on the Club and its supporters, as well as materially increasing the balance of the Victorian Red Cross Australian Sick and Wounded Fund.

REPORTS.

A report of the excursion to Upper Beaconsfield on Saturday, 13th November, was made by the leader, Mr. C. French, jun., who said that a party of ten members had spent a very interesting day in the district. They had been very cordially welcomed and invited to lunch by Dr. and Mrs. Drake, who afterwards showed them round their garden, which contains a number of good specimens of Australian trees and shrubs, among which was a specimen of the New South Wales Waratah bearing no less than thirteen spikes of bloom. After luncheon Mrs. Drake had conducted them to some of the beauty spots of the district, where a fair collection of flowering plants had been made. Owing to the cloudy day, insects were scarce, only a few species of buprestid beetles of the genus Stigmodera being secured. Cicadas were in thousands, and a number of specimens were secured for exchange purposes. Among the birds noticed were the Coachwhip-bird, Harmonious Thrush, Spotted Ground-Thrush, Sordid Wood-Swallow, Fire-tailed Finch, and Bell-bird. Returning towards Lower Beaconsfield through a fine fern gully on Dr. Drake's property, Mr. J. R. Tovey's week-end residence was reached, where again they were treated very hospitably by Mr. and Mrs. Tovey. He stated that the district is a good one for the field naturalist, and if a longer visit could be made earlier in the season the results would doubtless be of more importance. Mr. French said that

Dr. and Mrs. Drake had invited the Club to visit Beaconsfield next spring, and on the motion of Mr. F. Pitcher, seconded by Mr. French, a hearty vote of thanks was accorded to them and Mr. and Mrs. Tovey for their hospitality on this occasion.

A report of the excursion to Lilydale on Saturday, 27th November, was given by the leader, Mr. F. Chapman, A.L.S., who stated that about seventeen members visited a quarry on the Mooroolbark road. The quarry occurs in Yeringian mudstone, and fossils are extremely plentiful in it. During the afternoon numerous specimens of corals, crinoids, brachiopods, gasteropods, trilobites, &c., were obtained, the most noteworthy belonging to the last-named group. A number of specimens of pond-life were also obtained. Altogether, a very interesting afternoon was spent.

ELECTION OF MEMBERS.

On a ballot being taken, Miss E. E. Lawton, Presbyterian Ladies' College, East Melbourne; Mr. J. Eaton, 70 Rathmines-street, Fairfield; Mr. J. Kinsella, 187 Stanley-street, West Melbourne; and Mr. J. G. Mann, Australian Club, William-street, Melbourne, were duly elected ordinary members of the Club; and Miss M'Donald, Military Hospital, Glenroy, Mr. J. W. Crawley, Warrnambool, and Mr. F. Stone, Mildura, as country members.

A WELCOME.

Miss F. Bage, B.Sc., of the Women's Hostel, Queensland University, was accorded a welcome to the meeting by the president, who referred to the keen interest Miss Bage had always evidenced in the Club's welfare, even since her departure from Melbourne, and to the fact that she had recently been elected president of the Brisbane Field Naturalists' Club.

Miss Bage, in returning thanks to the meeting for the welcome accorded her, said the training and experience she had acquired at the Club's meetings and excursions peculiarly fitted her for the position of president of a similar society in Queensland. The practice of inducing members to make brief reference to their exhibits was a good one, and one that was always in vogue at the meetings of the Brisbane society.

REMARKS ON EXHIBITS.

Mr. E. E. Pescott, F.L.S., in referring to his and Mr. C. French's exhibit of orchids, drew attention to the unsuitable vernacular name given to the orchids *Cryptostylis longifolia* and *Caleya major*, the former being called the Duck, and the latter the Cockatoo Orchid. In his opinion the names should be reversed, for *Caleya major* looked exactly like a duck in flight when the labellum was extended. Reference was also made to the herbarium specimens exhibited of *Prasophyllum album* and *Chiloglottis trapeziforme*, both new records for Victoria.

Mr. F. Pitcher said that the only Acacia at present flowering in the Botanic Gardens was the species shown—*Acacia Mitchelli*, or Mitchell's Acacia. It is also called the Fringe Acacia, and is worthy of cultivation in our gardens. The fasciated specimen of the Rooted Cat's-ear was collected at Upper Pakenham, and had between sixty and seventy flower-heads dispersed over the stem, which was two feet high and two inches wide.

Mr. C. L. Plumridge and Mr. F. Pitcher called attention to their exhibits of flowering branches of the Victorian Blue-berry, *Elæocarpus cyaneus*, which makes an excellent garden shrub.

Mr. J. Searle, in referring to his report of the microfauna met with in the various water-holes during the Nyora excursion on Cup Day (2nd November), said that among the mosquito larvæ collected on that occasion were some that were supposed to belong to the little-known genus Mochlonyx. If such proves to be the case its discovery at Nyora will constitute the first record of its existence outside of Europe. He requested pond-hunters to keep a look-out for the larvæ, which have a pair of air sacs at either end of the body, by which they are enabled to remain under water in a horizontal position for a considerable length of time.

Mr. F. Spry said the genus Mochlonyx was little known in Europe, and no record exists of its discovery elsewhere.

PAPERS READ.

1. By Mr. J. H. Gatliff, "Descriptions of two New Varieties of Australian Cowries."

The author called attention to two cowries, from Western Australia and the Northern Territory respectively, which seemed to be of sufficient difference from normal type specimens to be worthy of varietal names. The Western Australian specimen was a variety of *Cypræa venusta*, Sowerby, and he had named it var. *Bakeri*, in honour of Mr. F. C. Baker, of Richmond, a well-known collector, while the Northern Territory specimen was a variety of *C. miliaris*, Gmelin, and had been named var. *Gabrieli*, in honour of Mr. C. J. Gabriel, a well-known member of the Club and an ardent conchologist. Owing to their highly-polished surfaces considerable difficulty had been experienced in securing photographs of them suitable for reproduction.

In reply to a query by the president as to the prevalence or otherwise of albinism among shells, the author stated that it did not seem to be so common as in other divisions of the animal kingdom; and in reply to Mr. Pitcher said that shells change considerably in character and markings with age, and develop colour rather than lose it.

2. By Mr. O. W. Rosenhain, entitled "A Naturalist in Java."

The author gave a highly interesting paper descriptive of a

recent visit to Java, which was illustrated by about eighty lantern slides depicting the natural beauties of the island, its vegetation, ruined temples, agriculture, &c. He said that it is almost impossible to convey by word of mouth any conception of the scenic beauty of the island, the luxuriance and variety of its vegetation, or the immensity of its volcanoes.

Several questions were asked relative to the paper, and in the course of his reply the author said that, notwithstanding the beauty of the tropical vegetation of the Botanic Gardens in Java and Ceylon, he considered the Melbourne Gardens equal to anything of their kind in the world, and deserved to be more prominently brought before visitors from other lands.

CHRISTMAS EXCURSION.

The Chairman said that, owing to the difficulty of securing accommodation at Torquay for an excursion at Christmas time, that locality had to be abandoned, and asked for a resolution relative to an excursion to some other locality. It seemed to be generally considered that the time was now too short to arrange for an extended excursion anywhere, consequently the proposal was dropped.

EXHIBITS.

By Miss Enid Ballhausen.—Specimens of Christmas Bells, *Blandfordia nobilis*, Smith.

By Mr. F. R. Beuhne.—Flowers of *Chieranthera linearis*, Cunn., from Tooborac.

By Mr. J. H. Gatliff.—Two new Australian varieties of cowries—viz., *Cypræa venusta*, Sowerby, var. *Bakeri*, nov.; *Cypræa miliaris*, Gmelin, var. *Gabrieli*, nov., in illustration of his paper: also *Cypræa miliaris*, Gmelin, *Cypræa Thersites*, Gray, *Cypræa Friendii*, Gray = *Scottii*, Gaskoin, and *Cypræa decipiens*, Smith.

By Miss G. Nethercote.—Flowering specimens of *Prostanthera lasiantha*, Lab., Christmas Bush, *Kunzea pedunculatis*, F. v. M., *Brunonia australis*, Smith, *Cassinia longifolia*, R. B., *Danthonia penicillata*, F. v. M., *Poa cæspitosa*, G. Forster, and *Leptorrhynchos tenuifolius*, F. v. M., collected at Wonga Park, 10/12/15.

By Mr. D. J. Paton.—Flowering specimens of *Eucalyptus gracilis* (one of the Mallees), *Brachyloma daphnoides*, *Melaleuca uncinata*, *Helichrysum apiculatum*, *H. semipapposum*, *Bursaria spinosa*, and *Cassinia longifolia*, from the Whipstick, near Bendigo; and the orchid *Pterostylis rufa*, var. *Mitchelli*, from Lockwood.

By Messrs. E. E. Pescott, F.L.S., and C. French, jun.—Herbarium specimens of the orchids *Prasophyllum album*, Rog., collected at Bayswater and Croydon, new for Victoria; *Chiloglottis trapeziforme*, Fitz., collected at Tallangatta by A. B. Braine, new for Victoria; and *Caleya minor*, R. Brown, collected

at Longlea, near Bendigo. Also fresh specimens of *Prasophyllum album*, Rog., from Somerville ; *Caleya major*, R. Brown, from Longlea and Tooborac ; *Prasophyllum Frenchii*, F. v. M., from Bayswater and Croydon ; and *Cryptostylis longifolia*, R. Brown, from Ringwood—the first-named being remarkable for its pleasant perfume. Also a potato with a small, perfect potato growing internally.

By Mr. F. Pitcher.—*Acacia Mitchelli*, Benth., Mitchell's Acacia, and *Elæocarpus cyaneus*, Aiton, Victorian Blue-berry, at present flowering in the Melbourne Botanic Garden ; also a fasciated stem of the Rooted Cat's-ear, *Hypochæris radicata*, Lin., two feet high and two inches wide, with between 60 and 70 flower-heads dispersed over it, collected at Upper Pakenham. A photograph of this plant was also exhibited.

By Mr. C. L. Plumridge.—Flowering specimens of *Elæocarpus cyaneus*, Victorian Blue-berry, grown at Kew.

By Mr. J. Searle.—Living specimen of the fresh-water polyp, Fredricella, sp.

After the usual conversazione the meeting terminated.

The Yarra Herring and the Tupong.—Dr. T. S. Hall, M.A., has forwarded the following note received from Mr. H. Quiney, of Mortlake, also a member of the F. N. Club, *re* the above fish. Mr. Quiney says :—"I was passing Hiscock's fish shop, in Moorabool-street, Geelong, one day in 1873 or 1874, when I saw about two dozen fish of a kind which seemed unfamiliar to me, so I went inside to make a closer inspection, when, to my surprise, I found them to be the Fresh-water Herring or Cucumber Fish, and on inquiring where they came from was also surprised to learn that they had been taken in Fenwick's Lake (the northern arm of Lake Connewarre), near the channel to the Barwon. This so-called lake is extremely salt, and is undrinkable. When I lived in Geelong, some years ago, the graylings or herrings could generally be caught with the fly during March, between Queen's Bridge, near Fyansford, and the Breakwater. They were never very plentiful—the biggest basket I remember would be about twenty—but they were all good-sized fish. Tupongs used to reach Lake Purrumbete (Manifold's), near Camperdown, when the outlet was open, in thousands, and breed there. In fact, there are plenty there now. Some years ago a flood-gate was placed in the outlet, and sometimes they are enclosed for two years or more. I endeavoured, some two years since, to get the Fisheries and Game Department to try them in Lake Wendouree, Ballarat, or some similar lake, but without success." [This paragraph has been held over from previous issues owing to pressure on space.—Ed. *Vict. Nat.*]

EXCURSION TO GEMBROOK.

Only a small party of members ventured on the week-end visit to Gembrook on Saturday, 16th October. Leaving town by the early train, Gembrook was reached soon after 1 p.m., just too late for the members to obtain additional supplies at the local store, owing to the institution of the Saturday half-holiday in the district; however, through the kindness of friends, this disappointment did not prove so serious as was at first anticipated. The journey by the narrow-gauge line from Ferntree Gully was delightful; the countryside was looking its best—everything bright and green, with fair quantities of flowers still decking the railway enclosures, while the tints displayed by the leaves of the gum saplings were in themselves worth seeing. As usual, the extensive nursery just beyond Emerald was a fine sight, and a noticeable addition to the plants grown there was a large plantation of the New Zealand Flax, *Phormium tenax*, for the fibre of which there is a great demand at present, and it seemed contrary to what we always understood as to the natural habitat of this plant to find it doing so well in such rich soil and at an elevation of nearly 1,000 feet above sea-level. On leaving the station our route took us through what was formerly the site of the Acclimatization Society's reserve, one of the party pointing out where the Club members camped in November, 1901, and had the enjoyable outing which is recorded in the *Naturalist* for December, 1901 (vol. xviii., p. 116). He said that, notwithstanding the opening-up of the reserve for settlement, it appeared to be little changed in the interval. Numerous plants in flower were noted along the road, such as the white *Epacris impressa*, the blue *Dampiera stricta*, the beautiful yellow flowers of *Hibbertia serpillifolia*, or the paler yellow of *Pimelea flava*. A fine plant of *Tecoma australis*, in full bloom, was rambling over some saplings near the roadside, forming a pretty object. About two miles from the station we came to the week-end hut which it was at first proposed to make our headquarters for about twenty-four hours; but, on a neighbour offering the use of a spare cottage, the first idea was abandoned. However, as a smart shower came on we made use of it as a temporary shelter, and then went for a ramble towards the Gembrook Creek, and in a tributary gully saw a splendid growth of the Coral Fern, *Gleichenia circinata*, climbing up the trees to a height of at least fifteen feet. Here also were many fine specimens of the King Fern, *Osmunda barbara*, noticeable by their dark, glossy fronds. Many fine eucalypts still remained hereabouts, mostly Mountain Ash, *Eucalyptus regnans*, but no doubt some day they will share the fate of their kindred nearer the railway, and provide material for a sawmill. It was now time to proceed to the cottage we had been invited

to occupy. This proved more than a makeshift, for we found everything provided for us—beds, bedding, furniture, cooking utensils, &c., and set in the midst of a fine old garden, full of flowers; so our lines were indeed cast in pleasant places. We soon had tea ready, and afterwards went for a stroll to Gembrook West, about a couple of miles distant. Along the roadside *Stackhousia linarifolia* grew in abundance, and a number of spikes of bloom were picked. These flowers keep well when picked, and it was noticed that their pleasant perfume increased perceptibly during the evening. The evening was spent chatting on a variety of subjects with Mr. and Mrs. M'Innes, who had so kindly placed the cottage at our disposal. Then we learned that the property had formerly been the country home of the late Mr. F. R. Godfrey, for many years a member of our Club, which accounted for the large number of fine exotic trees and shrubs round the house. Rain came on during the night, and prevented any early morning rambling. After breakfast a start was made for some well-wooded paddocks not far distant, where numerous birds were in evidence; but, in the absence of an ornithologist, I am unable to say whether any of the individuals seen belonged to uncommon species. A few butterflies of the commoner species were noted, while the green cicadas made themselves heard all round. A specimen of this insect was rescued from a small bird, which was endeavouring to make a meal of it. Leaving the cottage early in the afternoon, we made our way back to the station by the old road, gathering fine bunches of tinted gum-leaves and wild-flowers as we went along. The pea-flowered shrubs were past their best, but here and there sufficient remained to show that *Pultenæa scabra*, *P. Gunnii*, *P. Muelleri*, and *P. stricta* had been very fine. The white variety of *Tetratheca ciliata* was plentiful, the normal species not being so dark a pink as often met with. The white flowers of *Aster stellulatus* were conspicuous in many places in the scrub, while the deep blue of *Dampiera stricta* formed a fine contrast. Our trip, though slightly marred by rain, was an enjoyable one, and we regretted that so few members had availed themselves of the opportunity to visit this interesting district, which also has many scenic charms, while the pleasure of it was greatly enhanced by the kindness of Mr. and Mrs. M'Innes.—Harry Witty.

Exhibition of Wild-Flowers. — With reference to the flowers received from Sydney, it appears that parcels were sent by both Mr. J. H. Maiden, Government Botanist, and Mr. R. T. Baker, Curator of the Technological Museum, Sydney, but owing to the rush when opening the packages the names of the senders were unfortunately not recorded at the time.

THOMAS SERGEANT HALL.

Thomas Sergeant Hall was the son of a well-known Geelong citizen, Thomas March Hall, who, again, was the son of an English nonconformist clergyman. Dr. Hall's father was at first entered at Woodhouse Grove School, but, on account of weak health, was withdrawn, and educated privately. As usual in those days, his education was along classical lines, but he had a keen love of Nature, and when he entered upon a business life at Wakefield, in Yorkshire—a life that meant starting work daily at 7 a.m. and ending at 10 p.m.—he used to be up in the still earlier hours of the morning roaming about amongst the English woods. The life was too strenuous, and, after a serious breakdown, he left England in company with a few others, amongst whom were Messrs. George and William Hitchcock—names well known in Geelong, where they landed in 1849.

With his travelling companions he went, at a later date, to the goldfields, where, fortunately for himself, he had to live an open-air life that completely established his health. Leaving the goldfields, he entered into business—first in Ballarat, and later on in Geelong, where his son, T. S. Hall, was born, on 23rd December, 1858.

It was from his father, who was widely read and had a keen love of Nature, that Hall inherited his tendency towards and his keen interest in scientific work.

It is interesting to note, in view of his marked capacity for expressing himself clearly in simple language, that one of his father's sisters married a Mr. R. Sergeant, whose daughter, Emily Frances, was the well-known writer. She was born in 1851 and died in 1904. During her life she wrote no fewer than ninety novels, and it was from his connection with her family that Dr. Hall acquired his second name of Sergeant.

In 1867 he entered the Geelong Grammar School, remaining there until the close of 1877, when he was nineteen years old. Mr. Bracebridge Wilson was then head-master, but, possibly because Hall was not a boarder, he does not seem to have come much into contact with him, which, in view of the head-master's devotion to scientific work, is a matter of surprise and regret. J. L. Cuthbertson was the man who influenced him most, and Hall entered fully into the life of the school, both in work (such as it then was) and in sports—racing, boating, and football. We read in the *Quarterly*, the school magazine, for 1877, that in the football match against Wesley, played on the St. Kilda ground, "Austin, Smith, the two De Littles, and Hall shone brilliantly"; and, in the brief account of players given at the end of the year Hall is described as "the fastest man with the ball in the twenty; can get his

THOMAS SERGEANT HALL.

Born 23rd December, 1858

Died 21st December, 1915.

kick in the right direction from almost any position." However, as soon as school life was over he had more serious things than sport to think of. During his holidays he had been wont to spend his time exploring the rocks along the shores of Corio Bay or up the Moorabool valley, laying in a stock of knowledge and experience that stood him, and others also, in good stead in later years.

In 1879 he accepted a mastership in Wesley College, which he held for two years, at the same time attending lectures at the University. In 1884 and 1885 he held exhibitions at Ormond College, taking the degree of B.A. in the latter year, with honours in natural science. This was in the days of the late Sir Frederick M'Coy, when the chair of natural science covered a large number of subjects, and amongst them that of Palæontology, in which Hall had been interested from his boyhood.

In 1887 he was teaching at Girton College, Bendigo (Sandhurst, as it was then called), but the three following years found him back in Melbourne once more, working at the University, where the new chemical, physical, and biological laboratories had been equipped since his earlier student days. He devoted himself especially to biology, passing through the complete three years' course. In 1889 he took a prominent part in the foundation of the University Science Club, where he came into contact with his friend, Dr. G. B. Pritchard—in fact, it was due to their meeting on Science Club excursions that they began their joint work on the Tertiary deposits of Victoria. Hall's first paper, however, was on "Two New Species of Fossil Sponges from Sandhurst," published in 1888, the first joint one with Dr. Pritchard, on "The Lower Moorabool," being written in 1891.

From 1890 to 1893 he was Director of the Castlemaine School of Mines, where he was most successful as a teacher and organizer, his lectures covering a wide field of science subjects. It was whilst he held this post that he married Miss E. L. Hill, the sister of his life-long friend Dr. Charles Hill, and here his eldest son, March, was born, who is now serving "somewhere" at the front.

In 1893 Dr. Dendy was elected to the chair of biology in Canterbury College, New Zealand, and Hall succeeded him as Lecturer on Biology in the Melbourne University—a post that he held until his death. In recognition of his valuable work in natural science he was, in 1908, honoured with the degree of D.Sc. by his *Alma Mater*.

In 1888 he had joined the Field Naturalists' Club, and in 1890 the Royal Society of Victoria. Into the work of both of these he entered with enthusiasm on his return to Melbourne. He was now able to devote a large amount of time to research

work, specializing on the palæontological side of his subject. In 1891 he published his first paper on graptolites, an obscure group in the elucidation of which he did valuable work, and of which he came to be regarded as the one authority in Australia. Though obscure, the group is an important one, because certain species have definite relationships to the gold-bearing rocks of the Bendigo and Castlemaine district, and his most important paper is probably that on "The Geology of Castlemaine, with Subdivisions of Part of the Lower Silurian Rocks of Victoria, &c.," published by the Royal Society of Victoria in 1894. The last paper that he published was entitled "Victorian Graptolites, Part IV.," which was read in July, 1914. It was in recognition of his work on graptolites that in 1901 the Geological Society of London honoured him with the award of "The Balance of the Murchison Fund." In the Proceedings of the Society the following appears:—"The balance of the proceeds of the Murchison Geological Fund is awarded to Mr. Thomas Sergeant Hall in recognition of the value of his researches amongst the graptolites and other invertebrate fossils of Australia, and to aid him in the further study of the palæontology of the Southern Hemisphere."

In conjunction with Dr. Pritchard, he worked for many years on the Tertiary deposits of Victoria. Jointly they published some seven papers in the Royal Society, one of the most important of which, read in October, 1902, is entitled "A Suggested Nomenclature for the Marine Tertiary Deposits of Southern Australia," in which they suggested distinctive local names for the various subdivisions—names which have been generally adopted.

Not only did Dr. Hall enter with zest into teaching and research work, but he gave of his time ungrudgingly to assist in the organization of science. He had joined the Royal Society in 1890; in 1896 he became a member of the council, and from that day until just a year ago he did yeoman service for it. From 1897–99 he was librarian; from 1899–1914 he was honorary secretary, editing admirably the publications, taking, in fact, the leading part in all work connected with it, and contributing to its *Proceedings* some twenty-nine papers. In 1914 he was elected president, and again in 1915, but in March of the latter year he was obliged to send an apology for non-attendance, and thereafter his failing health prevented him from taking the chair.

To the work of the Australasian Association for the Advancement of Science he devoted much time and energy. He edited the volume of *Proceedings* of the Melbourne meetings in 1900 and 1913, acted as local secretary for Victoria from 1907 onwards, and was president of the geology section at the Hobart

meeting in 1902, delivering an address on "The Possibility of the Detailed Correlation of Australian Formations with Those of the Northern Hemisphere"—a subject to which he had devoted much attention. During the recent visit of the British Association in 1914 he was local secretary of the zoological section, and his wide general knowledge of Australian zoology and geology enabled him to be of great service to many of the visiting overseas members.

Not the least of his services to science in Victoria was the publication in 1899 of the "Catalogue of the Scientific and Technical Periodical Literature in the Libraries of Victoria." It required a man possessed of his general knowledge and capable of his patient, accurate, and methodical work to prepare this. In 1911, assisted by Mr. E. R. Pitt, of the Public Library, he issued a second and much enlarged edition.

To readers of the *Argus* and *Australasian* he was well known. Under the name of "Physicus" he contributed the column of "Science Notes" to the latter for many years, and in 1905–6 published a series of popular geological articles in the former. These, which are models of scientifically accurate writing couched in the simplest language, he brought together and published in 1909 under the title of "Victorian Hill and Dale."

He was keenly interested in all that referred to the fauna of Australia, and took a leading part in securing the reservation of Wilson's Promontory as a National Park; in fact, it was towards the end of 1914, during an official visit to the Park of the Committee of Management (of which he was an active member), that the first signs of his serious illness became apparent.

In the Field Naturalists' Club his work has been of the greatest service. He joined it in 1888, and when he was appointed to the University post in 1893 began at once to take an active part in the work of the Club. From 1895 onwards he was a member of its committee; from 1897–1900 he was vice-president, and from 1901–1903 he was president. After retiring from the presidency he still retained his active connection with the Club, serving as member of the committee until 1910, when he withdrew in order to give place to younger men. This did not in the least mean that he had lost interest in the work of the Club, whose meetings he continued to attend. In fact, as recently as July, 1915, when, after some months of illness, he thought that he was on the road to recovery, he undertook to act as leader of a party of members visiting the biological laboratory and museum in the University. This was his last official connection with the Club, and when it was over he realized the fact that he was no longer capable of work of this kind, and he very much appreciated the resolution passed by the Club in September last, at the suggestion of Mr. F. G. A.

Barnard, expressing the anxiety of the members lest he had overtaxed his strength, and assuring him of their earnest and most hearty wishes for a return to good health.

His interests were wide, and the *Victorian Naturalist* contains many papers written by him—some on zoological, some on geological subjects; others (and these are perhaps the best) on subjects of general interest, designed to guide and stimulate younger and less experienced workers. Amongst these we may recall "What's in a Name?" "A Hunt for a Name," and, best of all, "Ungarnered Grain." From the latter, which formed his presidential address in 1909, we extract the following, which will serve to show the point of view from which he regarded the Club and its work:—"We are field naturalists. . . . . Are the cyanide bottle, the collecting-jar, the vasculum, or the geological hammer to be our tyrants and not our slaves? Worse and worse still, are we bound to describe what we see and tell what we think we know in a hideous jargon of scientific terms. . . . Technical terms are necessary—sometimes . . . . but don't mistake the glib use of polysyllables for knowledge. . . . If there are two ways of expressing an idea, take the simpler one. . . . Anyone who has had any teaching experience, or who has tried to explain some scientific fact to his friends, knows well how wonderfully his ideas are clarified by the necessity of translating into simple English some thought that he thinks he understands when clothed in technical terms. . . . The Club needs the support of all its members, whether they are original investigators or not. All I ask is that a dozen or so will devote some of their spare time seriously to some problem that requires settling, or will do something, however small, to help on the knowledge of natural history in our State. . . . If you are puzzled about the choice of a subject, let me recommend the lines—

> 'Do the work that's nearest,
> Though it's dull at whiles.'

There is no need to go to the polar regions for a subject. It lies here, under your hand."

It was evident to those of us who saw him during the last few months of the past year that the end must come soon. There were times when he seemed to rally and to be almost his old self—cheerful and bright, and anxious to get back to work again; but gradually, week after week, he became feebler, until on 21st December the end came.

There are amongst us not a few to whom he was "guide, philosopher, and friend." He was entirely unselfish, always ready to help, and he leaves behind him the record of a man who not only did good work himself, but helped and inspired others to do the same.—W. B. S.

A STUDY OF BIRDS AT BREEDING TIME.

By G. A. KEARTLAND.

(*Read before the Field Naturalists' Club of Victoria, 13th Sept.*, 1915.)

DURING the past few years much attention has been paid to bird photography, and by that means we have been familiarized with the forms of the nests which many of our birds construct. Then we have had photographs of the young ones in the various stages of development, thus showing that, whilst some birds undergo scarcely any change in colour or markings between the time they are able to fly and arriving at maturity, others require periods of from six months to four or five years before acquiring mature plumage. Take the well-known Mudlark, *Grallina picata*, as an instance. Unless taken in the hand and the softness of the feathers noted, it is impossible to distinguish a bird a month old from the parent of the same sex. Others, like the Stubble Quail, *Coturnix pectoralis*, are six months old before the sexes can be distinguished by the plumage, and at that age the young ones are like their parents.

Then we have the Night Heron, *Nycticorax caledonicus*, the young of which have been mistaken for birds of another species, owing to the great difference in plumage. How long they are before assuming adult livery is doubtful—probably two years. The Pacific Gull, *Gabianus pacificus*, takes three or four years in changing from the modest brown of the young to the beautiful white and black of the old ones. This list might be extended, but my main object in writing these lines is to draw the attention of members to the study of the work of incubation, and to try if we can ascertain in what species both sexes share the labour.

The same instinct which influences our domestic poultry in laying a greater number of eggs when the nests are cleared every day, and which causes the hen to become broody if the eggs are allowed to accumulate until about a dozen are laid, appears to exist in many of our wild birds. I know of instances in which the nests of both Mud-Larks, *Grallina picata*, and Black-and-White Fantails, *Saulopocta motacilloides*, were robbed or destroyed three times, and then the birds laid a fourth clutch and reared their broods. Whilst at the Fitzroy River, N.W.A., I found three nests of the Little Friar-bird, *Philemon sordidus*, each containing young ones, which the black boy who accompanied me appropriated as a delicacy. On visiting the same trees a fortnight later I found that each pair of birds had built a fresh nest, and had already laid a full clutch of eggs.

Of course, it is well known that amongst the pigeons and doves both sexes take part in the sitting. The female generally does all the night work, but is relieved during the day by her mate, and both parents share the task of feeding the young until

they are able to fly. The female of the Swamp or Brown Quail, *Synoicus australis*, does all the sitting, and if her mate or any other bird of the same species approaches her nest she raises her feathers like a game-hen and charges the intruder with surprising ferocity. This is continued until the brood are about a week old, when the male joins the family, of which he seems to be intensely proud. In another week the female resigns all interest in the brood, which are reared by her mate until they are about a month old. After that period they have to look out for themselves, as their parents are usually occupied with the care of a fresh clutch of eggs. With regard to the Stubble Quail, *Coturnix pectoralis*, much may yet be learned, but my opinion is that the female soon tires of the young ones. In many cases where I have flushed a bird with a brood of little ones on the opening day of the shooting season, it has been the male bird that accompanied them. They scatter in all directions, but if left alone the call of the old bird soon attracts the family together.

Several of our honey-eaters construct a bag-like nest of grass-stems and spiders' web amongst the swinging foliage on the end of a slender twig, which is frequently swayed violently by the wind, but the eggs are seldom broken unless the nest is brought in contact with something solid. The explanation is that when the bird is sitting she grasps the bottom of the nest with her claws and holds the eggs in place on each side of her breast by means of the long feathers along her side, supported by her wings. I have seen a Red-throated Honey-eater sitting calmly on her nest, which was fastened by the rim to the extreme end of a thin branch of a bauhinia tree. The wind was blowing a gale, and the nest was thrown about as if fastened on a whip-lash, and several times it turned bottom uppermost, but when examined next day the eggs were all safe. Other birds, like the Crows and Crow-Shrikes, use strong sticks for their building material, and construct their nests in a secure manner in a forked branch strong enough to defy the wind. But probably the most wonderful piece of bird architecture is to be seen in the nest of the Reed-Warbler. How such a frail bird manages to strip the material from the growing reeds is a mystery, but the commencement of the structure is a puzzle. In the finished nest we find four or five reeds bound together, with the deep, cup-shaped nest between them, about three feet from the top of the reeds, and no matter how the wind blows the bird and its eggs are safe.

But the group which is probably the most interesting to study is the Parrot family. Whether all members follow the same practice or not I cannot say, but I have no doubt regarding several species. In every case where I have disturbed a bird from its nest it has proved to be the female, and

an examination of the nest and eggs has generally revealed that the hollow selected has been surprisingly small. This puzzled me for some time, but since I have tried to breed them in an aviary I think the problem is solved. Some years ago I had a pair of Cockatoo-Parrots which reared three broods of young ones in the season. Their nesting log was a small one which I had intended to use for Warbling Grass-Parrakeets, *Melopsittacus undulatus*. Next season I thought I would provide better quarters for them, and changed the log for one much larger. The female laid several clutches of eggs, but reared no young ones, as the eggs were all destroyed before incubation was completed, and each shell found on the floor of the aviary had a large hole broken in its side. I blamed the mice for the mischief. I next tried to breed the Green-Leek, *Polytelis barrabandi*, and the female laid five eggs in a box nest, but they were soon all destroyed one after another. Again the mice were blamed, as each shell had a hole bitten in the side. My little Warbling Grass-Parrakeets were provided with a small hollow log, and reared sixteen young ones in the season.

Last September I built a large aviary and determined to try the Green-Leeks again. The birds mated, and in due time four eggs were laid in a large nest. The female sat from the time the first egg was laid, and the male fed her whilst she was on the nest, but she attacked him viciously whenever he tried to get behind her. Soon afterwards an empty egg-shell was found on the floor of the aviary, and in less than a week all were broken, the male bird being caught *in flagrante delicto*. This habit of the female sitting from the time the first egg is laid no doubt is responsible for the fact that the brood of young ones vary greatly in size. Whilst some small ones are only clothed in pin feathers, others are fully fledged and able to fly. It also accounts for the error some authors have fallen into in stating that, on attaining full plumage, there is no difference in the appearance of the sexes in the Green-Leek. Another fact came under my notice whilst on a collecting tour some time ago. I saw several flocks of both Green-Leeks and Red-rumped Grass-Parrakeets, consisting of from twenty to thirty birds, without a solitary female amongst them. The conclusion I came to was that all the females were occupied with family cares, and that after the males had fed their mates they had a bachelors' excursion on their own account.

Our wild ducks are very interesting to watch. When the female has built her nest amongst the rushes on a swamp or selected the hollow branch of a large tree she lines it with down plucked from her own breast, so that when she feels inclined to stay for a long swim on a pool or stream she can cover up the eggs and keep them warm for a long time. An examination of the down will often determine the species to

which the nest belongs. Various opinions have been expressed as to how the ducks transfer their broods from their nest to the water, but I think there is very little doubt that the parent bird either carries them in her bill, one at a time, to the pool, or else conveys them to the ground, and then, when all are down, just calls them after her until they walk to the water.

Of course, it is known that birds have many enemies to contend with at breeding time, and so they resort to various methods of guarding their eggs. The Grebes (Podiceps), which make a floating nest amongst the aquatic plants, cover their eggs with a quantity of the vegetable matter in the vicinity, so that the eggs, which are white when first laid, soon become so stained that they are often nearly black before hatching. The little Black-fronted Dottrel, *Ægialitis nigrifrons*, which lays its eggs on the bare ground near water, generally plasters them over with mud before wandering in search of food. This so successfully disguises them that I have stood for some time within a few feet of a nest before discovering it.

There are many birds of whose nesting habits but little has been published, and my chief motive for penning the foregoing lines is to direct some of our members to a field in which much useful work may yet be done.

THE LATE DR. HALL.—A limited number of copies of the plate in this issue have been printed on large paper suitable for framing, and can be obtained from Mr. J. A. Kershaw, F.E.S., National Museum, Melbourne, at one shilling each.

RECENT LOSSES.—We regret to have to record the death recently of Mr. H. Andrews, of "Grosvenor," Malvern, who, though unknown to the present generation of members, has been a consistent supporter of the Club for many years, having been elected so long ago as August, 1885. There also passed away, on 28th December last, Mr. S. W. Fulton, of Armadale, who for several years was a prominent member of the Club, and from 1902 to 1906 held the position of librarian. His *forte* was marine crustacea, on which he contributed several notes to the *Naturalist*.

A VISITING NATURALIST.—The return to Victoria on furlough of Mr. Gerald F. Hill, F.E.S., Government Entomologist of the Northern Territory, and a member of the Club, affords us the opportunity of congratulating him on the excellent work he is doing with regard to the mosquitoes and other pests of that part of Australia, as evidenced by the appendix to the last annual report of the Administrator of the Territory. Mr. Hill, it may be remarked, was one of the earliest junior members of the Club, and some twenty years ago carried off several prizes offered by the Club for natural history collections by juniors.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 17th January, 1916.

In the absence of the president, Dr. C. S. Sutton, one of the vice-presidents, Mr. F. Pitcher, occupied the chair, and about 36 members and visitors were present.

THE LATE DR. T. S. HALL, M.A.

The chairman said it was with sincere sorrow and regret that he had to announce the death, since the previous meeting of the Club, of an old and highly esteemed member in the person of Dr. T. S. Hall. By his demise the Club, the Royal Society, the University, and the State had lost a scientific worker of exceptional merit. There was no need for him to supplement Professor W. B. Spencer's able *résumé* of our lamented member's life-work that appears in the current issue of the *Naturalist*; he would content himself by inviting members to assent to his motion that an expression of the Club's sympathy and condolence be forwarded to Mrs. Hall by the hon. secretary.

The resolution was seconded by Mr. F. Chapman, and all present signified their acquiescence by rising.

CORRESPONDENCE.

From Mr. A. J. Campbell, Col. M. B.O.U., expressing his appreciation of the Club's commendation of his action in dedicating his oological collection to the State, and mentioning that his first oological papers were read before the Club in the early eighties.

The chairman and Mr. H. B. Williamson eulogized the action of Mr. Campbell in donating such a valuable collection—one that had taken practically a lifetime to acquire — to the National Museum in order that others might enjoy the benefit of his labour.

From Mr. F. Lewis, Acting Chief Inspector of Fisheries and Game, advising that the Minister had refused the request of petitioners that all lakes except Hattah and Mournpoul be removed from the sanctuary in the Mildura district which the Club was instrumental in having proclaimed about twelve months ago.

In explanation of the letter, the hon. secretary said that the president, Dr. C. S. Sutton, had pledged the Club to act with several kindred bodies in resisting the efforts of a number of sportsmen, residing at Mildura and in its neighbourhood, to curtail the area of the sanctuary in question. In conformity

with that promise he had been instructed to write to the Acting Chief Inspector of Fisheries and Game and enter an emphatic protest against the abrogation of the sanctuary or the curtailment of its area. The chairman said the meeting would be pleased to learn that the highly satisfactory memorandum from Mr. F. Lewis, the Acting Chief Inspector of Fisheries and Game, was principally due to the prompt action of the president and hon. secretary.

REPORT.

A report of the excursion to Beaumaris on Saturday, 18th December, was given by the leader, Mr. J. Shephard, who said that a combined party of members of the Club and of the Microscopical Society, numbering about twenty, visited Beaumaris by motor char-a-banc for the purpose of studying marine life. Unfortunately, the weather proved very unpleasant, and on reaching the beach it was found that the strong south-west wind had lashed up the sea, and prevented the tide receding, as it should have done according to the almanac. However, a somewhat sheltered bay was found, and duly searched, but only those crustaceans commonly met with were noted: calcareous sponges, which are usually plentiful in the locality, were entirely absent. A number of echinoderms and other fossils were noted in the cliff-face.

ELECTION OF MEMBER.

On a ballot being taken, Mr. Edwin Cox, Grace Park, Hawthorn, was duly elected an ordinary member of the Club.

GENERAL BUSINESS.

Mr. P. R. H. St. John said members would be pleased to learn that he had again been appointed as a member of the Victorian Plant Research Committee by the British Association for the Advancement of Science.

REMARKS BY EXHIBITORS.

Mr. J. Searle called attention to his exhibit of specimens of the rare freshwater crustacean *Koonunga cursor*, Sayce, from North Portland. This crustacean was named by the late Mr. O. A. Sayce in 1907 from specimens found near Ringwood. Some four years later he had found a single specimen at Nyora: now Mr. Ralph Millar reports large numbers of them in a dam at North Portland, near his school. This species is the only representative of the Anaspidacea in Australia, and the only member of the group living at sea-level. The other two members of the group, each of which represents a separate genus, are found at high elevations in Tasmania. Mr. Sayce's paper will be found in the *Victorian Naturalist* for November, 1907 (vol. xxiv., p. 117).

Mr. P. R. H. St. John, in referring to his exhibit of samples

of crude oil of *Melaleuca nesophila*, F. v. M., and *Eucalyptus macrandra*, F. v. M., said that the former was distilled on 19/11/15 and the latter on 12/1/16 from material obtained, through the kindness of the Curator, from cultivated trees in the Melbourne Botanic Gardens. Both trees were natives of Western Australia, and, so far as he was aware, this was the first record of the distillation of oil from either. One or both oils might ultimately prove of great commercial value. The specimen of timber of *Eucalyptus obliqua*, L'Heritier, Messmate, shown was obtained in the Forrest district. Whilst on a visit to that locality during the Christmas holidays he had noticed a pile of sawn timber at least half a mile long and of considerable height. No gum veins were visible in any balk constituting that pile. There was no need for us to send to Tasmania for hardwood when a superior article existed at our doors.

Mr. E. R. Webb drew attention to his exhibit of fourteen varieties of freshwater shells obtained from the Upper Richmond River, New South Wales. Some of the shells were found on plains rarely covered with water.

Mr. T. S. Hart, M.Sc., invited inspection of his exhibit of roots of *Exocarpos cupressiformis*, Native Cherry or Cherry Ballart, showing parasitic and auto-parasitic root attachments, and said that the specimens exhibited showed attachments of the roots of *Exocarpos cupressiformis* to roots of other plants —namely, *Acacia armata*, *Eucalyptus amygdalina* (from Scoresby), and *Eucalyptus dives* (from Creswick). The ends of some of the rootlets of Exocarpos are expanded, and form closely appressed cushions on the exterior of the other roots. These "cushions" are easily detached, and are very liable to be detached in digging out the roots. Examination of some of them showed a relatively slender outgrowth from the "cushion" through the outer tissues of the root of the other plant. These attachments are most readily found by grubbing a small tree near the Exocarpos, and examining its roots close to the butt of the tree. Specimens of roots of *Exocarpos cupressiformis* were also exhibited showing loops and cross connections originating in auto-parasitic attachments. "Cushions" are formed, appressed to other parts of the roots of the same plant, and eventually the union of the two roots becomes very complete, as can be seen in a cross section through the junctions. These loopings can be readily found by tracing the roots of the Exocarpus outwards from its butt.

PAPER READ.

By Mr. J. W. Audas, F.L.S., entitled "Glimpses *en passant* on a Trip to Mount Beenak."

The author, in an interesting paper, enumerated the prin-

cipal species of flowering plants, shrubs, &c., noted by the wayside on a trip taken in October last from Pakenham to Mount Beenak. By reason of the eminently favourable season the flora of the district was at its best, such species as *Pultenæa mollis*, *Oxylobium alpestre*, and *Tecoma australis*, var. *Latrobei*, being exceptionally abundant and luxuriant. A visit was made to the Nar-Nar-Goon State school, where, it was pleasing to note, the master and pupils had many native plants and shrubs under cultivation. Among others, *Callistemon lanceolatus* seemed to respond well to the care and attention bestowed, two fine bushes being clothed with large brush-like spikes of rich vermilion colour. Over a hundred miles was covered by the author during his trip, and he advocated the opening up of the district by the Government to tourists and holiday-makers.

In the discussion on the paper that ensued, the chairman and Messrs. F. G. A. Barnard, G. Coghill, P. R. H. St. John, R. W. Armitage, and H. B. Williamson took part.

NATURAL HISTORY NOTES.

Mr. R. W. Armitage, M.Sc., said that, according to several reports that recently appeared in the daily papers, the wild fowl, particularly wild ducks, were dying in large numbers in many parts of the State. Various reasons had been assigned to account for the mortality. One was that the epidemic was induced by the large quantities of decaying vegetation in the areas they frequented. He would like to hear an expression of opinion on the subject from some member present.

Mr. G. A. Keartland said he had no doubt that the mortality among the wild ducks was due to poison laid by the farmers to encompass their destruction. In some parts of the State the wild fowl had become so numerous as to pollute the water. To prevent this the land-owners had possibly adopted the procedure mentioned. He admitted that it would be a difficult matter to substantiate a charge against them, since they were not in the habit of parading their intentions to the general public. Any difference of opinion that existed, as to whether the birds died from disease or from poison, could be settled by cursory examination. If a bird had died from disease it would be thin and miserable; whereas it would be in good condition if its death had been occasioned by poison.

Mr. G. A. Keartland said that in his aviary at the present time might be witnessed a remarkable instance of reversion to original habits. Some time ago he liberated his canaries among the other birds, when one pair built a nest about one foot from the ground in a tussock of prairie grass. As it was close to the wire front, the birds were disturbed by a cat. A week afterwards they built another open nest in a tussock and reared

their brood. They have now built in a branch of a fig-tree, about five feet from the ground, and are sitting on eggs. The nest is an open structure like that of the Goldfinch, and, although exposed to sun and wind, there appears to be every prospect of another brood. The birds are fed on plain canary seed and thistles, besides what they pick up amongst the grass.

Mr. H. W. Davey, F.E.S., forwarded an interesting note on the occurrence in immense numbers of the plant bug, *Nysius vinitor*, known as the Rutherglen Fly, in high alpine regions during the early part of December, and recording the fact that snow seemed to have a fatal attraction for them.

EXHIBITS.

By Mr. J. W. Audas, F.L.S. — Herbarium specimens of *Asterolasia Muelleri* (*Eriostemon correifolius*, F. v. M.), Benth., Lemon Star Bush; *Oxylobium alpestre*, F. v. M., Mountain Shaggy Pea; *Notofagus* (*Fagus*) *Cunninghamii*, Myrtle Beech, &c., collected at Mount Beenak, October, 1915, in illustration of paper.

By Mr. T. S. Hart, M.Sc.—Base and roots of *Exocarpos cupressiformis*, Native Cherry, showing roots parasitic (or partially so) on themselves.

By Mr. J. G. O'Donoghue.—Cabinet specimen of schorl, or black tourmaline.

By Mr. D. J. Paton, Bendigo. — Flowering specimens of *Eucalyptus uncinata*, Hooked Mallee, *Eucalyptus viridis*, Green Mallee, *Acacia retinodes*, and *Humea squamea*, from Whipstick Scrub, Bendigo.

By Mr. F. Pitcher.—Specimen of the white-flowering form of *Erythræa australis*, R. B., Australian Centaury, from Belgrave district, Christmas, 1915.

By Mr. J. Searle.—Interesting and rare crustacean, *Koonunga cursor*, from North Portland (previously only recorded from Ringwood and Nyora).

By Mr. P. R. H. St. John (on behalf of the Curator, Melbourne Botanic Gardens).—Samples of crude oil of *Melaleuca nesophila*, F. v. Mueller, Western Australia, distilled 19th November, 1915, and *Eucalyptus macrandra*, F. v. M., Western Australia, distilled 12th January, 1916 (with fresh specimen in bloom); material obtained from cultivated trees in Melbourne Botanic Gardens, the samples of oil prepared by exhibitor. Also specimen of timber of *Eucalyptus obliqua*, L'Heritier, Messmate, obtained by exhibitor from Forrest district, 29/12/15.

By Mr. E. R. Webb.—Fourteen varieties of freshwater shells from the Upper Richmond River, N.S.W.

After the usual conversazione the meeting terminated.

EXCURSION TO LILYDALE.

THE afternoon of Saturday, 27th November, made a bright and favourable break in a chain of showery Saturdays, when a party of fourteen naturalists, armed with nearly as many different kinds of hammers, walked from Lilydale station to the fossil quarry on the Mooroolbark road. On the way a rumour was circulated to the effect that a native had declared the distance to the quarry to be five miles: but it was discovered that the native, as usual, is often the last person that should be appealed to for accurate information of his district, the actual distance being under three miles. At the quarry we were joined by three lady members who had arrived by an earlier train, and had kindly prepared the way for refreshment, with which the party was regaled after some serious work of stone-breaking had been carried out. By the kind thought of the ladies the *menu* was agreeably varied by strawberries and cream, and the afternoon tea seemed to have so braced the energies of several devoted collectors that they could only with great difficulty be persuaded to leave the quarry to the gathering darkness and the local kine:

> "Owre mony a weary ledge they limpit,
> An' aye the tither stane they thumpit."

The quarry has been excavated in a dome-shaped anticline of Yeringian mudstone, and the fact that the rocks are here conspicuously folded accounts for the hardness of the material compared with that in quarries not far distant. Hence the use of the rock as a source of road-metal. After the rock-folding had taken place, there seems to have been some minor earth oscillations, for the jointed and fractured rock is, in some bands, composed of small blocks tightly wedged against and into one another, suggesting horizontal movement and shattering. The collecting of fossils proceeded apace, whilst our pond-hunters were also busy sampling the fair-sized pond filling the bottom of the quarry-hole. Anon the monotony of the hammering was relieved by the appropriate recital, from our carcinologist, of the classic poem of Bret Harte's relative to Brown, the fossil-bone collector. Fossils are plentiful in this quarry, the only *fault* in the rock being its jointed character, the stone more often breaking through a fossil than otherwise. The leader had a busy time scanning each record of the rocks as it turned up, and many interesting finds were made, the most notable being a perfect pygidium of *Calymene*, a beautifully preserved tail and counterpart of the newly-described *Goldius greenii*, and several examples of the genus *Loxonema*. Gathering clouds promised showery weather, and a southerly change of wind was experi-

enced during the walk back over the paddocks to Lilydale, but the rain held off until near the end of the journey to town.

The following genera and species of Silurian fossils were found during the afternoon :—

Corals.—Rugose, simple forms, allied to *Lindstræmia* or *Streptelasma*, *Pleurodictyum megastomum*, *Aulopora*, sp.

Crinoids.—Numerous stems and impressions of columnars and one calyx, badly preserved.

Brachiopoda.—*Crania*, sp., *Orbiculoidea* sp., *Stropheodonta alata*, (?) *Strophonella* sp., *Leptæna rhomboidalis*, *Chonetes* sp., *Orthis elegantula*, *O.* cf. *testudinaria*, *Camarotœchia* sp., (?) *Uncinulus* sp., *Nucleospira australis*, *Atrypa reticularis*, *Spirifer* cf. *crispus*, *S.* cf. *lilydalensis*.

Bivalves.—*Grammysia* sp., *Leptodomus* sp., *Nucula taylori*, *Palæoneilo*, 3 spp., *Goniophora* cf. *australis*.

Gasteropods.—*Carinaropsis* sp., *Pleurotomaria* sp., *Murchisonia*, sp., *Loxonema* sp.

Pteropod.—*Coleolus* sp.

Cephalopod.—*Cycloceras capillosum*.

Trilobites.—*Calymene* sp., *Goldius greenii*.

Mr. J. Searle has been good enough to look through his catch of specimens collected in the quarry-hole pond, and to furnish the following list :—*Daphnia carinata*, vars. *gravis* and *eurycephala* (nearly every specimen carrying ephippial eggs), *Boeckella oblonga*, *Cyclops leuckarti*, *Cypridopsis minna*, Red Mites (*Hydrachnidæ*), planarian worms.—F. Chapman.

The Austral Avian Record.—With the first part of volume iii. (June, 1915) this journal is enlarged, measuring now about $7\frac{1}{2}$ x 10 inches, though the letter-press is almost the same size as previously. The number contains a coloured plate, reproduced from Watling's painting of 1790, of the bird named by Latham *Columba pallida*, but which Mr. Gregory M. Mathews shows is really a cuckoo, *Cuculus pallidus*. Considerable space is devoted to the ornithology of the "Dictionnaire des Sciences Naturelles," published by Levrault, Paris, 1804–30, through which several alterations in the names of Australian birds are made. An extinct pigeon of Lord Howe Island is described from a painting by George Raper as *Raperia godmanæ*. Part 2 (November, 1915) contains a coloured plate of the Brown-headed Honeyeater, also reproduced from the original painting by Watling. Twenty pages are devoted to the birds described in an old Dutch work, "Table des Planches Enlum," of Boddaert (1783), while further additions and corrections to the editor's "Reference-list" are given. Mention should also be made of the concluding part of vol. ii. (August, 1915), which consists of an exhaustive index of sixty pages in double column of the scientific names contained in vols. i. and ii.

ON SOME SMALLER FOSSILS FROM THE RED LIMESTONE AT GRANGE BURN, NEAR HAMILTON, WITH A NOTE ON A NEW SPECIES OF BOLIVINA.

BY FREDK. CHAPMAN, A.L.S., F.R.M.S., Palæontologist, National Museum, Melbourne.

(*Read before the Field Naturalists' Club of Victoria, 8th Nov.*, 1915.)

IN Memoir No. 5 of the Melbourne National Museum † I discussed the stratigraphical relationships of the limestone at Grange Burn and Muddy Creek to the adjacent strata, and also pointed out the significance of the fossil fauna of this limestone. It contains, amongst other fossils, such typical Janjukian forms as *Linthia* of the *L. mooraboolensis* type and *Lepidocyclina tournoueri*, which are especially representative of the Batesford and Moorabool Valley Tertiaries. The intermediate position of this limestone, between the Balcombian below and the Kalimnan above, was shown in the work mentioned by data from river cliff sections.

The object of the present note is to place on record the results of a detailed examination of the finer material of the above-mentioned *Lepidocyclina* limestone, which lends further support to the view that it belongs to the Batesford horizon and represents a similar phase of marine conditions of the Victorian Tertiaries.

This limestone, occurring in the bluff opposite Mr. Henty's homestead of "The Caves," is of an ochreous brown colour, but farther down the Grange Burn, towards its junction with Muddy Creek, it is of a reddish or pink tint. Some of the material obtained opposite Henty's was weathered, and occurred on ledges and in pockets of the limestone, and to obtain the specimens it required no treatment beyond washing, drying, and sifting.

The following is a list of the smaller fossils obtained from the weathered limestone. The species previously recorded from Batesford,‡ with which locality the Grange Burn occurrence is stratigraphically associated, are marked *.

FORAMINIFERA.—*Bolivina hentyana*, sp. nov., **Nodosaria obliqua*, L., sp., *Marginulina costata*, Batsch, sp., **Polymorphina elegantissima*, Parker and Jones, **P. regina*, Brady, Parker and Jones, *Sagraina raphanus*, P. and J., **Truncatulina ungeriana*, d'Orb., sp., **T. refulgens*, Montf., sp., **Pulvinulina elegans*, d'Orb., sp.,* *Rotalia calcar*, d'Orb., sp., **Gypsina howchini*, Chapm., **Amphistegina lessonii*, d'Orb., **Operculina complanata*, Defr., **O. complanata*, var. *granulosa*, Leymerie, **Lepidocyclina*

† July, 1914, pp. 45 and 47.

‡ See "A Study of the Batesford Limestone," Proc. Roy. Soc., Vict., vol. xxii. (N.S.), part ii., 1910, pp. 302–308.

tournoueri, Lemoine and Douvillé, **L. martini*, Schlumberger, **L. marginata*, Michelotti, sp.

CORALS.—**Mopsea hamiltoni*, Thomson, sp.

ECHINOIDS.—Spines of a cidaroid, indet.

VERMES.—*Serpula*, sp.

POLYZOA.—*Cellaria rigida*, var. *venusta*, MacGill, *Macropora clarkei*, T.-Woods, sp., *Lekythopora*, sp., near *L. kitsoni*, Maplestone, **Smittia tatei*, T.-Woods, sp., **Porina gracilis*, Milne Edwards, sp., *Retepora*, sp., *Entalophora australis*, Busk., *Crisia*, sp.

OSTRACODA.—**Bairdia amygdaloides*, G. S. Brady, *Cythere postdeclivis*, Chapm.

FORAMINIFERA.

The only species of the foraminifera new to the Batesford fauna are *Bolivina hentyana*, *Marginulina costata*, and *Sagraina raphanus*. Species which are distinctly typical of the Batesford fauna are the lepidocycline foraminifera and *Gypsina howchini*. The former, although found occasionally in lower strata at Muddy Creek, particularly dominate this horizon. *Lepidocyclina* limestone has also been noted from Keilor and Cape Schanck. *Gypsina howchini*, besides occurring at Batesford, has recently been obtained from Janjukian strata in the Mallee bores.

BOLIVINA HENTYANA, sp. nov. Tertiary (Janjukian). Limestone bluff, opposite Henty's, Grange Burn. x 26.

Description of BOLIVINA HENTYANA, sp. nov.,† (fig.)

Test long ovate, moderately broad at the oral extremity

† Named in honour of Lieut. E. E. Henty, who fell at Gallipoli on 7th August this year, and in recognition of his helpfulness to the writer whilst on geological work at Hamilton in 1912.

and tapering to a moderately sharp apex at the aboral end; compressed, with rounded edges. Sutures textularian, fairly distinct; chambers moderately long, sutures oblique. Lateral faces slightly depressed along the median axis and ornamented with numerous fine, raised striæ, more or less parallel.

Length, 2.07 mm.; greatest width, near oral end, .73 mm.; thickness of test, .23 mm.

Observations.—At first sight this ornamental little species suggested the complanate form of *Polymorphina* from the English Crag (Pliocene), described by Searles Wood as *P. frondiformis.** A close examination, however, shows our species to belong to the genus *Bolivina*, since the chambers are regularly disposed in the textularian manner, and the aperture is excentric. The nearest analogue is *Bolivina nobilis*, Hantken,† a species which is found throughout our Tertiary beds and is even living at the present day in the Southern Ocean. The new species is extremely broad as compared with von Hantken's form, whilst the striæ are more pronounced, closer together, and continuous from end to end of the test.

Holotype in the National Museum.

POLYZOA.

A species occurring in this series of fossils worthy of special notice is *Lekythopora*. Its nearest related form is *L. kitsoni*, Maplestone, which was described from the Janjukian of Waurn Ponds. The present form differs in the radiating arrangement of the zooecia.

OSTRACODA.

Bairdia amygdaloides is still found living in Bass Strait, and its distribution extends up to Port Jackson and into the South Pacific, but it appears to be confined to the waters of the southern hemisphere. The species is found in the fossil condition in Janjukian (Miocene) strata at Batesford, and in the Miocene and Lower Pliocene of the Mallee bores.

Cythere postdeclivis is of especial interest, since it was only recently described from the Miocene, and probably Lower Pliocene, beds of the Mallee bores.

* See Jones, Parker, and Brady, "Mon. Foram. Crag," 1866, Appendices I. and II. (footnotes), pl. i., figs. 62, 63; pl. iv., figs. 11–14.

† Mitthеil, "Jahrb. d. k. ung. Geol. Anstalt," vol. iv., 1875, p. 65, pl. xv., figs. 4*a*, *b*; Chapman, Journ. Linn. Soc., Lond., Zool., vol. xxx., 1907, p. 32, pl. iv., fig. 81. *Id.*, "Biol. Results F.I.S. *Endeavour*," vol. iii., part 1, 1915, p. 19.

DESCRIPTIONS OF TWO NEW AUSTRALIAN VARIETIES OF COWRIES.

By J. H. GATLIFF.

(*Read before the Field Naturalists' Club of Victoria, 13th Dec.*, 1915.)

No group of shells is perhaps more sought after by collectors than the Cowries, and recently there came into my possession two specimens, which, while agreeing in the main with two well-established species, differed sufficiently to be worthy of varietal distinction. I have therefore decided to record them under the names of *Cypræa venusta*, Sowerby, var. *bakeri*, and *C. miliaris*, Gmelin, var. *gabrieli*.

As *Cypræa venusta*, Sowerby, is rare, the following description by Brazier may be quoted *:—

"Shell pyriformly ovate, rather thin, markedly ventricose, base almost flat; sides steep, deeply notched, anterior end contracted and prominent, posterior end produced, narrow, aperture almost straight, except in front, rather open; teeth thick, obtuse, faint purplish-white, about twenty-four on the outer edge, and confined to the margin of the aperture; on the columellar side the teeth are short, oval, blunt, and larger, becoming almost obsolete in front: cream-coloured with a cinnamon tinge, smooth and polished, variegated with rather large brown spots of irregular size and irregularly distributed; the cinnamon tinge is slightly deeper at the ends: base white and perfectly smooth, sides light, extremities rather recurved, interior pinkish-white. It is three inches long, breadth about an inch and a half. Was found at Cervantes Island, west coast of Australia."

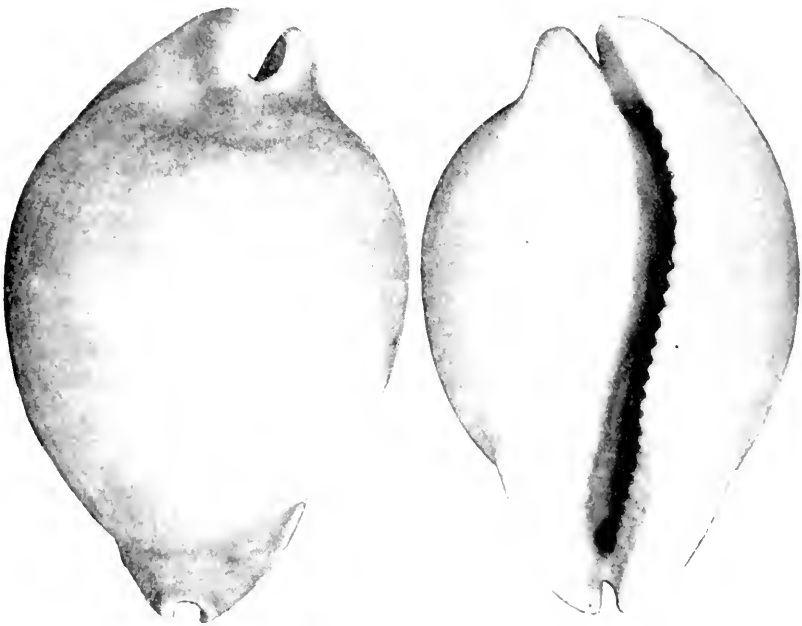
CYPRÆA VENUSTA, Sowerby, var. BAKERI, nov.

This differs from the foregoing in being a solid shell, with obsolete irregularly-sized striæ, or incremental growth lines, discernible underlying the enamel, and extending lengthwise over the dorsum, which, at the anterior end, is sparsely, irregularly contused. The base is white, and two faintly distinguishable white bands cross the dorsum, one being narrow and almost central, the other at the anterior is rather broader; the remainder of the dorsum is tinted with flesh colour. The absence of any of the brown maculations mentioned as occurring in other specimens makes this variety readily distinguishable.

Dimensions of Type of Variety.—Length, 72 mm.; breadth, 50 mm.; height, 45.5 mm.

Locality.—Western Australia.

* "Description and Geographical Range of Cowries in Australasia," by John Brazier, C.M.Z.S., page 25.



Figs. 1, 2—*Cypræa venusta*, Sowerby, var. *bakeri*, nov.

Observations.—Named in honour of Mr F. H. Baker, who has rendered much assistance by mounting molluscan odontophores for microscopic examination.

Type of variety in my collection.

CYPRÆA MILIARIS, Gmelin, var. GABRIELI, nov.

Brazier, in his publication quoted, at page 22, describes an Australian specimen of *C. miliaris*, Gmelin, and of this well-known species states:—"It is of an oblong-ovate form, attenuated anteriorly, extremities produced, a little reflexed, sides pitted, back citron-yellow, profusely sprinkled with eyes of various sizes, sides and base white."

The variety now named *gabrieli* is semi-translucent, base and margins white, dorsum uniformly of a fawn colour, without the slightest trace of any spot or other coloration or marking on any part of the shell. It is more ventricose than the ordinary form, and the grooves of the teeth extend on the outer lip nearly to the outer margin. There are twenty-one teeth on the outer lip and fifteen on the columellar side.

Dimensions of Type of Variety.—Length, 40 mm.; breadth, 26 mm.; height, 20 mm.

Fig. 3—*Cypræa miliaris*, Gmelin, var. *gabrieli*, nov.

Locality.—Northern Territory, Australia.

Observations.—Named in honour of my ardent and able collaborator, Mr. Charles J. Gabriel.

Type of variety in my collection.

The figures are from photographs kindly taken by Mr. R. R. Duncan.

NOTES FROM THE NATIONAL MUSEUM.

AN exhibit that is attracting a good deal of attention has just been completed and placed on view. It consists of a Samoyede sledge drawn by two reindeer. In the sledge a man is seated, wearing the characteristic outer cloak and close-fitting hood of reindeer fur. In his left hand he holds a single rein, and in his right the long pole, coloured red, white, and blue, like that of a barber, with which the animals are guided. The harnessing of the animals is absolutely correct, thanks to the assistance of Mr. E. Eide, a Norwegian, who has been accustomed to handling reindeer in his native country. A woman, in her picturesque winter costume, stands by the side of the sledge. She wears an outer cloak of light-coloured reindeer fur, the upper part of which is decorated with inset lines of darker fur and patches of coloured cloth—material derived from Russian traders with whom the Samoyedes come in contact. The skirt has three flounces of dogs' skin fur, and her head is covered with a dark brown hood of the same material. Both the man and woman wear under-cloaks of reindeer fur, and in the case of these the fur side is worn innermost for the sake of warmth. Each of them wears also long fur stockings encased in decorated fur boots.

The scene, including its surroundings of snow, has been made as true to nature as possible. The Samoyede people are the

most primitive of the races inhabiting the extreme northern parts of Russia and Siberia within the Arctic Circle. They have no fixed abodes, and wander over the frozen plains, or tundra, that skirt the Arctic Ocean. During the summer they live in little wigwam-like tents, covered with skin or birch bark, that can easily be packed up and carried about. In winter they dwell in huts half-buried in the ground. They support themselves partly by fishing, but mainly by the produce of their herds of reindeer, an animal which may be said to be everything to the Samoyede. While alive it carries him about, and he drinks its milk; when dead he eats its flesh and uses its fur for clothing and for covering his tents.

The specimens were secured by the Museum from the Royal Academy of Sciences in Petrograd in exchange for a collection of Central Australian native objects.

Another new exhibit of great interest is a specimen of the very rare Okapi, from Central Africa. The first indication of the existence of this animal was afforded by two bandoliers secured by Sir Harry Johnston in 1900 from natives in the forests bordering the Semliki River. The Semliki connects the two lakes, Albert Edward Nyanza and Albert Nyanza, on the north-east boundary of the Congo Free State. These bandoliers had been made from the skin of the flanks of some animal, the very characteristic black and white longitudinal striping of which naturally gave rise to the idea that it was a zebra, so that it was described first of all under the name of *Equus johnstoni*. In 1901 a complete specimen was secured and sent to London. It showed the animal to be cloven-footed like an antelope or giraffe, and so quite unlike a horse or zebra. The striping is confined to the haunches and upper part of the fore and hind limb, not extending on to the body. The ears are large, the neck moderately long, and the head and skull distinctly giraffe-like, with a pair of small horns in the male distinctly suggestive of those of the giraffe, to which it is closely allied. It has been placed in the family Giraffidæ under the name of *Okapia johnstoni*. Okapia is the native name given to the animal by the Wambutti or Akka, the pigmy race that inhabits, just as the Okapi itself does, the dense equatorial forests that border the Semliki and Ituri Rivers in the north-east part of the Congo State, where man and beast are safe from the attacks of light-loving, predatory animals. Natives living in the more open parts are very reluctant to penetrate these equatorial forests, where heat, moisture, gloom, and silence are perpetual, and hence it was that the Okapi remained so long undiscovered. No other museum in the Empire except the British Museum in London possesses a specimen of this rare and interesting animal.

THE "RUTHERGLEN FLY."—When on the Australian Alps last week I was greatly impressed by the immense numbers of the small plant bug, *Nysius vinitor*, commonly known as the Rutherglen Fly, when its name was legion, everything being completely smothered with them. Even the leathery-foliaged Snow Gums were not immune from attack, the bugs swarming on their young shoots, while the low alpine shrubs were in many instances almost hidden from view by the clustering bugs, and if you lifted a stone hundreds of these insects would be found beneath it. This makes one realize that later on, with favouring winds, they may descend to lower levels and attack cultivated fruits and plants. A remarkable fact I noticed was that snow had a great and fatal attraction for them, and, as large quantities of snow still remain on the highest peaks, immense numbers are being destroyed by this means, but their numbers are so great that I doubt if this can make any appreciable difference. Most of the snow patches are quite altered in colour owing to their being covered with the dead bodies of this insect. A large area of snow on the Omeo road over Mount Hotham (6,100 feet, the highest road in Australia) completely blocks it, and the coach has to leave the road here and struggle up the side of the mount above the road and then descend on the other side of the snow to regain the track again. To enable the coach to descend, large chains are wrapped round the hind wheels to assist the brakes; even then it is a nerve-testing experience for both driver and horses, and one feels glad to see them regain the road in safety. As this patch of snow is still fifteen feet deep at the road, it should be the means of destroying an immense number of these insects before it finally melts and disappears.—H. W. DAVEY, F.E.S. 13/12/15.

[Numerous newspaper reports from various parts of the State as to the numbers of this insect noticed this season bear out Mr. Davey's apprehension as to their presence in lower country later on.—ED. *Vict. Nat.*]

DISEASE AMONG WILD DUCKS.—In connection with the question raised at the January meeting of the Club regarding the unusual mortality among water-fowl, the following extract from the *Victorian Poultry Journal* of 1st February will be read with interest. The editor, Mr. H. V. Hawkins, says:—"A disease has broken out amongst the wild duck at Winton Swamp, near Benalla. Breeders will doubtless remember that thousands died a few years ago, and I was instructed by the Government to make a thorough investigation as to the probable cause. Many old residents thought the mortality was due to phosphorized wheat laid for rabbits, but it appeared to

me that the disease was fowl cholera, due largely to the hot weather then prevailing, with the consequent partial drying-up of the swamp, thus leaving stagnant pools of water, which became partly heated by the sun, resulting in a severe outbreak of cholera. I am of opinion similar conditions prevail now, and it is very probable the disease has again broken out. Not only are water-fowl being affected, but it is attacking domesticated hens. The germ of fowl cholera finds great scope for activity in sun-warmed, stagnant water, and the authorities would be well advised to take some steps to clear the swamp of dead carcasses, and use a few tons of lime around the pools, which possibly may be termed the breeding-ground of this trouble. It would be a thousand pities for the wild duck to be exterminated at Winton, which has been for years past a popular resort. I understand a similar outbreak has occurred at Lake Lalbert, but, as I am not personally acquainted with that lake, I cannot offer an opinion. It is the muddy, half-dried-up pools surrounding these swamps that cause the trouble, and that is where the liming would be the cheapest and possibly the most effective remedy."

The Australian Flora in Applied Art.—It is evidently the intention of the Technical Education Branch of the New South Wales Department of Public Instruction to publish a series of volumes under this heading, as a very handsome and useful work is to hand, designated—Part I.: The Waratah. Its author is Mr. R. T. Baker, F.L.S., Curator of the Technological Museum, Sydney, and the whole get-up of the work reflects great credit both on him and the Government Printer. Numerous illustrations, both in colour and black and white, testify as to the adaptability of the Waratah, both flowers and foliage, for use as ornament in architecture, bookbinding, ceramics, ironwork, lace, wall-papers, &c., while in the literature of the subject the author never loses sight of his contention that the Waratah, taking into consideration its many qualifications, should be the national flower of Australia. Coloured illustrations are given of the Victorian and Tasmanian species, as well as the more generally known New South Wales species, and, while the latter is undoubtedly the most showy object from a floral point of view, it is pleasing to note that the Victorian species provides a very handsome wood for the cabinet-maker. Seeing that the Victorian tree is quite unknown to the majority of Victorian residents owing to the inaccessibility of its habitat, we trust that its timber will not be allowed to be exploited without control, and the species exterminated.

The Victorian Naturalist.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday, 14th February, 1916.

The president, Dr. C. S. Sutton, occupied the chair, and about forty members and visitors were present.

CORRESPONDENCE.

From Mrs. E. L. Hall, conveying her appreciation of the Club's expression of sympathy and regret at the death of her husband, Dr. T. S. Hall, and expressing the hope that the deep interest evidenced by him in the Club's welfare would be cultivated by all its members.

REPORTS.

A report of the excursion to the Richmond quarries on 22nd January was forwarded by the leader, Mr. J. Searle, who stated that about fourteen members took part in the outing. In the quarry nearest the river large numbers of the crab *Hymenosoma lacustris* were found; the shrimp-like Xiphocaris was also very plentiful, abounding among the weeds fringing the water, and must afford a considerable amount of food for the perch and bream said to be plentiful in the holes. The water is of great depth—from 50 to 60 feet—the quarries being separated from one another by a narrow ridge of well-formed columnar basalt. In the smaller quarry numerous Copepoda were found, and the rather rare Cladocera, *Daphnia lumholtzi*, was taken in fair numbers. Many interesting forms of Protozoa, such as Platycola, Vaginicola, Thuricola, Stylocola, Falliculina, were secured. Desmids and diatoms were also plentiful, and among the latter was the erratic *Basillaria paradoxis*, the peculiar movements of which are always attractive when viewed under the microscope. The eastern wall of the quarry affords an excellent example of radiating prismatic basalt, and is worth inspection by those interested. Finally, a visit was made to a quarry-hole to the north-west of the present workings. This is being used as a tip for rubbish, but the water in it usually yields good supplies of rotifers, &c. On this occasion we found *Brachionus mulleri* and Pedalion in great numbers, while a protozoon, probably a Trichodema, fairly swarmed. Hoping to secure a few more specimens of *Daphnia lumholtzi*, the quarries were again visited, with two other members of the Club, on Saturday last, 12th February. On this occasion a long line with tow net was taken to sample the lower depths, and, though disappointed

in securing the Daphnia, which had totally disappeared since the previous visit, the net brought up a small fragment of Cordylophora, thus adding a new locality for this interesting hydroid. It seems a pity that these holes, which are so interesting to the student of pond-life, should be filled up. Could not an effort be made to at least retain some portion as a collecting-ground for the "pond-lifer"?

Mr. A. D. Hardy inquired whether any member of the excursion party present had noticed in the water contained in the excavations the alga *Monostroma expansa*, which has not been found elsewhere. It is most conspicuous when at maturity, floating and partially buoyed up by gas bubbles, and ballasted with water snails, when it appears like its marine cousin, the Sea Lettuce or Ulva, but unlike it in being of only one cell thickness, and therefore difficult to handle.

Mr. J. Stickland said that he had collected *Monostroma expansa* many years ago in the quarries.

Messrs. A. C. Gates and C. A. Nethercote gave some account of the excursion to the Dee Valley and Ben Cairn from 29th to 31st of January which was to a great extent spoiled by unpleasant weather. Miss G. Nethercote subsequently furnished a report, which appears on another page.

In the absence of Mr. E. E. Pescott, the president gave a brief report of the excursion to the Burnley Horticultural Gardens on Saturday, 12th February, when about fifty members and visitors were present. Owing to the indisposition of Mr. Pescott, the duties appertaining to leadership were ably discharged by Mr. Garside, who gave some account of the various experiments which are being carried out in the orchard. Subsequently, Mr. F. Beulme, who has a wide-world reputation as an apiculturist, took the party in hand, and demonstrated the ease and confidence with which the usually pugnacious bees can be handled by one conversant with their ways and habits. Later the party was welcomed by Mr. Pescott, who expressed a wish that the visit might be repeated next year at a slightly later date. After partaking of fruit and refreshments, kindly provided by Mr. Pescott, the party dispersed.

Mr. F. Beulme, in supplementing the president's remarks, said that, owing to the many and varied questions put to him by the members of the excursion party, he had not done justice to his subject. Much of what he had intended saying had to be left unsaid by reason of lack of time. If the Club felt so disposed, he would be prepared to give an evening on "Bees."

ELECTION OF MEMBERS.

On a ballot being taken, Miss Bertha Keartland, Cramer-street, Preston, was duly elected as an ordinary member of

the Club: and Dr. W. Elliot Drake, "Woonda Mia," Upper Beaconsfield, and Mr. Anton Vroland, State school, Elmore, as country members.

GENERAL BUSINESS.

Mr. G. Coghill expressed the opinion that the Club should abandon the present system of election by ballot for the inclusion of new members, and elect on a show of hands. The system of election by ballot was cumbersome, and occupied far too much time.

On the motion of Mr. Coghill, seconded by Mr. A. D. Hardy, the matter was referred to the committee for consideration.

REMARKS BY EXHIBITORS.

Mr. F. Pitcher drew attention to a flowering spray of Twisted Acacia, or Lightwood, *Acacia implexa*, from an aged tree near the Park-street gate of the Botanic Gardens. The tree, which was at present an object of interest to the visitors to the Gardens, had never bloomed so freely as at present. It was simply one mass of trusses of pale lemon flowers, and since the recent rains more foliage and blooms had been put forth.

Mr. P. R. H. St. John said he was exhibiting, on behalf of the Curator of the Melbourne Botanic Gardens, samples of crude oil derived from cultivated plants in the Gardens. The crude oil of *Eucalyptus occidentalis* was distilled on 2/2/16, and that from *Calythrix Sullivani* on 7/2/16. The sample of oil labelled *Eucalyptus coriacea*, var. *alpina*, was obtained from material collected by Dr. W. H. Green in the Bright district in December, 1915, and distilled on 3/2/16. In every instance the samples shown constituted a first record of the extraction of oil from the species mentioned. The exhibit by Miss A. Fuller of a variegated form of *Eucalyptus coriacea* was, he said, unique. Heretofore he had only known this peculiarity to have evidenced itself in *Eucalyptus viminalis* and *Eucalyptus amygdalina*.

Mr. J. Stickland directed attention to his exhibit, under the microscope, of the rotifer *Limnias ceratophylli*, which now occurs in extraordinary abundance in the Botanic Gardens lakes. The fan-shaped cluster shown contained forty individuals attached to one original tube.

Mr. C. Daley said that among the geological specimens he exhibited were samples, in the rough and polished state, of marble from Buchan and Toongabbie, Gippsland, and Angaston, South Australia. The Angaston marble is being used in the erection of the Commonwealth offices in the Strand, London. The rough and polished specimens of serpentine were from Mount Wellington, Gippsland, and the corundum and slate, showing graptolites, were from the same locality.

PAPER READ.

By Mr. J. G. O'Donoghue, entitled "Rambles in Raak."

The author gave a very interesting description of a fortnight's collecting in the Mallee, about 40 miles south of Mildura, during October last, in the course of which a large variety of natural history objects were met with.

Mr. A. D. Hardy, F.L.S., said the author had contributed a very useful paper, by reason of the fact that he had touched upon a variety of subjects. Since the plants collected during the trip had been submitted for verification to the National Herbarium, the botanical references would be of considerable value.

NATURAL HISTORY NOTE.

An interesting natural history note on the Sydney Crayfish, *Palinurus Hügeli*, Heller, was contributed by Mr. H. W. Davey, F.E.S., who said:—Last week I received from Portland a crayfish that was quite unknown to the local fishermen. It was taken in the craypots in the ordinary way, and it was suggested that it was a new species. I found, on examination, that it was the Sydney Crayfish, *Palinurus Hügeli*, Heller. This is of interest, as I believe this to be a new locality for this species, and it is also, I understand, the farthest west it has yet been recorded from. The late Professor M'Coy, in his "Zoology of Victoria," writes of this species as follows:—"It is so rare south of New South Wales that I have only seen one (now in Museum here, and figured in the 'Prodromus,' vol. ii., pl. 149) and heard of another caught on the Victorian coast near the Port Phillip Heads."

EXHIBITS.

By Mr. C. Daley, F.L.S.—Marble from Buchan, East Gippsland, and Angaston, South Australia, rough and polished; serpentine and corundum with slate, from Mount Wellington, Central Gippsland; marble from Toongabbie, Gippsland.

By Miss A. Fuller.—Variegated form of *Eucalyptus coriacea*, Cunn.; photograph of Hydrangea, 8½ feet in height and 15 feet in diameter, growing at Paddington, Sydney, N.S.W.

By Mr. J. G. O'Donoghue.—Arrow-shaped crystals of gypsum (sulphate of lime), from Raak, Mildura district.

By Mr. D. J. Paton, Bendigo.—Flowering specimens of *Exocarpos aphylla*, *Humea ozothamnoides*, *Brachyloma ciliatum*, *Acacia implexa*, and *Eucalyptus leucoxylon*, from the Whipstick Forest, near Bendigo.

By Mr. F. Pitcher, on behalf of Curator of Melbourne Botanic Gardens.—Blooms of Twisted Acacia or Lightwood, *Acacia implexa*, from Melbourne Botanic Gardens.

By Mr. P. R. H. St. John.—Oils distilled at Melbourne Botanic Gardens, as mentioned in remarks on exhibits.

By Mr. J. Stickland.—Under microscope, rotifer, *Limnias ceratophylla*, from Botanic Gardens lake.

After the usual conversazione the meeting terminated.

EXCURSION TO THE DEE VALLEY AND BEN CAIRN.

This excursion, arranged so as to include the Foundation Day holiday, was unfortunately marred by inclement weather—an unusual occurrence for the end of January. Another disappointing circumstance was that the leader, Mr. F. G. A. Barnard, owing to business matters, was unable to take part in the trip, but he made up for his absence by providing us with sketch maps of the district and a suggested programme, and also arranged for accommodation at West Warburton. Steady rain set in on Friday, 28th January, and continued next day, with the result that only three members left town by the early afternoon train. On arrival at West Warburton the few remaining hours of daylight were spent along the banks of the Yarra, where the creamy flowers of the Prickly Box, *Bursaria spinosa*, provided a pretty sight. Steady rain still continued on Sunday morning, and, though close at hand, Ben Cairn was quite blotted out from view. It was therefore determined to follow up Yankee Jim's Creek towards Old Warburton. Along the road many familiar plants and shrubs were met with, but none of them was in bloom. On the way a Spine-billed Honeyeater, *Acanthorhynchus tenuirostris*, was captured, benumbed by the cold and dripping with rain. Following down Backstairs Creek towards Warburton, it was noticeable that, notwithstanding the rain, there was less water in the stream than when visited twelve months before, in the midst of a dry spell. A track along the Yarra was taken for a little way, and then the road through Millgrove was followed to our starting-place, West Warburton. In the afternoon a visit was paid to the Britannia Falls. On the way back Mr. Cuming was kind enough to show us over the wood distillation works, and explain the methods adopted in obtaining numerous useful products from condemned eucalyptus timber from the clearings on the hillsides, which would otherwise be wasted. The practice is, instead of selecting only the trees suitable for saw-milling, to entirely clear the ground of all the timber, the best trees being sent to the sawmill and the rest to the chemical works. By this plan it has been found that the forest has a better chance of reproducing itself, and there is less litter. On Monday morning (31st) Ben Cairn stood out boldly, and, though rain

still fell at intervals, we determined to try and reach the top, 3,400 feet above sea-level, so made an early start. Crossing the Yarra by the bridge near the spot where the Dee adds its contribution to the main stream, we followed up the Dee for a short distance, then, striking westerly, followed a tram track for about two miles, when a marked track was followed to the top. About half a mile up the tram track the new O'Shannassy aqueduct was crossed. From there on we passed through, and sometimes above, magnificent fern gullies. One very fine one contained many splendid specimens of the Myrtle Beech, *Notofagus* (*Fagus*) *Cunninghami*, which alone were worth the climb. The track then became very steep, and before reaching the top half a mile or so of the Christmas-bush, *Prostanthera lasianthos*, in full bloom, was traversed, which, though slightly past its best, was exceedingly beautiful. Here the rasping cry of the Gang-Gang Cockatoo was heard, and on reaching the top many of the birds were seen, their red heads rendering them conspicuous. By this time the rain had cleared off, and, except towards Donna Buang, the splendid view was unspoiled. To the east the Baw Baws were sharply defined, Mounts Baw Baw, Mueller, and Erica being easily picked out, with another range showing up behind them. The Yarra valley could be traced for miles, while the townships of Millgrove, Warburton, and Yarra Junction lay spread out below us. Here we missed the topographical knowledge of our intended leader in naming the various ranges in view. It would be a distinct advantage to tourists visiting this rock, which is undoubtedly the finest view-point in the district, if a direction plate, similar to that on Flinders Peak, at the You Yangs, were provided for their information. Few flowers beyond those mentioned were noticed, the season being well advanced. A number of birds were noted, among which the following may be mentioned:—Brown Hawk, Gang-Gang Cockatoo, Sacred Kingfisher, Kookaburra, Blue Wren, Flame-breasted Robin, Yellow Robin, White-browed Wood-Swallow, Pennant's Parrakeet, Rosella Parrot, Pallid Cuckoo, and Black-and-white Fantail.—GERTRUDE M. T. NETHERCOTE.

KANGAROOS.—That young Victorians have considerable difficulty in seeing kangaroos in a wild state seems contrary, at any rate, to the prevailing conclusions of people in the old country. In recent "Notes for Boys," in the *Argus*, a correspondent reports seeing in January half a dozen full-grown kangaroos about 2½ miles west of Wallan. Further afield correspondents report kangaroos between Outtrim and Inverloch, Upper Maffra, and Yarram.

A NATURALIST IN JAVA.

By O. W. ROSENHAIN.

(*Read before the Field Naturalists' Club of Victoria, 13th Dec.*, 1915.)

IF I were asked where was the Garden of Eden, I should say in Java—this wonderland region of never-failing delight to the lover of natural beauty. Nature has been so profuse in her gifts in this beauty land that the struggle for existence plays a very unimportant part in the life and cares of the natives; excess of wealth is of very little benefit, and fashions do not exist.

There is almost too much to be admired in Java, and one carries away a realization that he has seen a number of the most beautiful spots on earth, but lacks distinct remembrance of the details of any one of them.

Java has an area of about 50,000 square miles calculated on latitude and longitude, but in reality the area is much greater, the mountains being many and steep, the soil rich; cultivation is carried on almost to the very highest point, which adds many hundreds, if not thousands, of square miles. Roughly, there are 8,000,000 acres under cultivation, of which $3\frac{1}{2}$ millions are rice, 2 millions sugar; the balance is made up of coffee, tea, tapioca, rubber, &c., &c. The teak forests cover about $1\frac{1}{2}$ million acres; cutting is limited, and replanting a condition. The seasons are the west monsoon (this is the wet period), from December to April, and the dry season or south-east monsoon is from May to November, and, I think, is certainly the best and most comfortable time to travel. In the rainy season the rain comes down in sheets.

The one outstanding feature throughout Java to the naturalist and observer is the appreciation of the Dutch authorities to the value of trees. On landing at the first port, Soerabaya, the large tamarind and kanari trees along the streets cannot but arrest one's attention. The days are always hot, and driving under these avenues of shade trees (from 50 to 100 feet high, meeting at the top) is most agreeable and delightful, and so it is from one end of the island to the other. In the cities of Soerabaya and Djokja I saw the largest shade trees I have ever seen. I have never seen a picture of a tree that could convey to me any idea of the size of those to be seen in these two cities. In Soerabaya, about 200 yards from my hotel were kanari trees, tamarinds, and *Ficus elastica* of which I could not gauge or estimate the height; a large and tall flag-pole at the side of one of the trees in the Governor's residence grounds was barely more than a quarter of the height of the tree (*Ficus elastica*). Not only were they high, but the spread was enormous; a hundred people could easily sit under

its shade at any time of the day. The post-office is also surrounded by immense kanari. Along the streets in this quarter the tamarinds are enormous. The beauty of all these trees is that they are green all the year. It is almost impossible to photograph them; they are too immense. The added beauty of these trees is that they are useful. The kanari has a nut kernel like an almond, just as large, but of a more delicate taste, and is much sought by the Javanese: the tamarind is also an article of commerce, while the *Ficus elastica* is the native rubber-tree.

Besides these shade trees there are the waringin trees, probably belonging to the banyan family, which also grow to an enormous size. In front of our hotel in Weltev-reden is one such tree, which completely shuts out any sight of the large buildings behind. This tree could certainly shelter the inhabitants of a fair-sized village.

In such a wonderland as Java one can only see a few out of the hundreds of places worth visiting. Java is lavishly endowed with every form of luxurious vegetation, and is capable of cultivation to the highest degree. Two or three crops per year can be gathered from the fertile soil by employing a system of rotation encouraged by the Dutch.

Java is the home of tropical vegetation. There are rare specimens of flora and fauna to attract botanists and zoologists, volcanoes and other phenomena to interest geologists, racial Governmental problems for students of colonial administration, ruined temples to occupy the attention of the archæologist, big game for hunting, novel scenes and objects to busy the sightseer, collector, or photographer.

The jungle in Java is intensely beautiful. No photograph, sketch, or description can adequately picture the mysterious nature of the jungle—magnificent trees, giants of the forests, creepers which climb from tree to tree with large, variegated leaves, rattans which attain a length of a hundred yards, and probably grow several inches in a day, wonderful orchids, palms, tree-ferns, flame-trees, &c., &c. The scene is bewildering. There is an atmosphere of indescribable something in this dense and almost impenetrable forest: the beauty of the scene, the marvellous wealth of nature, absolutely carry one away for the time being. On one occasion, while travelling in the train, we passed a forest of flame-trees in flower (*Flamboyane*). As far as one could see there was one mass of large, bright red flowers. The trees were all about 12 feet high, and this mass of red carpet can better be imagined than described. It took the train twenty minutes to pass this beauty spot. Wild-flowers, however, are few, hence the absence of colour; in fact, Java is very poorly endowed with flowers of any kind.

The finest railway scenery I have ever seen from a carriage window in any part of the world is the ride from Djokja to Tjibatoe, and I cannot imagine anything finer to be seen anywhere. From Tissakmalaya the train commences its run of about 100 miles through the Preanger Ranges; higher and higher it climbs, over embankments and bridges and viaducts, stretched at a dizzy height, rounding sharp curves, cutting on the edge of mountains, looking down 1,500 feet into rocky ravines, rushing streams, and forests and cultivations in the distance. Everything in the landscape is beautiful, strange, and typical of the wonderland of beauty; every moment brings some new thrill of pleasure.

There are fifteen active and about seventy extinct volcanoes in Java. I visited the active crater Bromo. To see this crater, which is 8,000 feet above sea-level, one leaves Tosari, 6,000 feet above sea-level, a sanatorium about 90 miles from Soerabaya, in the Tengger Mountains, at 4.30 a.m., on ponies, which are sure-footed, but otherwse badly trained, for the natives have no idea of handling horses. As the sun rises at 6 a.m., and there is only ten minutes or so of dawn, we were well on our way of fifteen miles before we could see where we were. The mountains here, as all over Java, are very steep; it was one continuous up-and-down on corduroy road. From the top of the Moenggal Pass (ten miles from Tosari), 8,200 feet above sea-level, the most extraordinary panorama probably in the world is unfolded before you, awe-inspiring in its grandeur. A thousand feet below is the Sandsea, probably a sunken crater; then follows one crater after another, and in the distance, towering above all others, stands Smero, rising to a height of 12,000 feet, still smouldering. This is the highest mountain in Java. The grim grandeur and uncanny beauty of this strange landscape are bewildering; there is probably no more extraordinary panorama of volcanic scenery anywhere. There is such a fantastic formation, such weird colouring, such an absence of what one is accustomed to—a constant reminder of the mysterious working of a tremendous hidden force—that it is difficult to realize where you are. The day of our visit was perfect. Standing on the edge of the crater, we could see, 800 feet below, the pit from which sulphur and sulphur fumes were bursting forth; the rumbling noise, the loud reports, the shaking of the ground beneath us, were fearsome. The scene is wonderfully impressive, and brings one to a realization of the fact that these monsters are responsible alike for the extraordinary richness of the soil and for those eruptions which take place at long intervals, and without warning lay desolate the valleys around them.

The temple Boro Boedoer, or the "Shrine of Many

Buddhas," is supposed to have been built to shelter some portion of the ashes of Buddha, and was built about 1,100 years ago. To appreciate such a structure one should give days to its study. In a rapid survey much of the very best is certain to be passed unseen. The temple consists of five square terraces enclosing galleries of bas-reliefs. There are niches every few feet, with life-size images of Buddha; above these are three circular terraces with latticed dagobas, each enclosing an image of Buddha. There are, in all, 72 dagobas; the top or crowning dagoba is 168 feet in circumference. All the stone used in the temple was cut to shape and then placed in position, no binding, such as mortar or cement, being used. The figures portrayed on the walls of galleries are scenes depicting every phase of life and action: similar scenes may still be seen in Java to-day. Kings, nobles, dancing girls, palace women, peasants and fishermen, elephants, horses, deer, sheep, buffaloes, goats, pigs, rats, cats, camels, monkeys, crocodiles, peacocks, doves, swans, ducks, chariots, ploughs, musical instruments, ships, and hundreds of other things are depicted here in a way that is wonderfully lifelike and true. The Javanese were Buddhists, but are now Mohammedans. The temple is 480 feet square and 130 feet high. The view from the top is grand and glorious—almost overwhelming. There is something sad in contemplating all this wealth of art that represents a civilization of bygone ages. It seems to be the same old story of the expansion of one to the detriment of the other, and the inevitable sequel of defeat and destruction. If these galleries of reliefs were placed in one line they would reach about five miles.

It is a pity no reliable information can be obtained about the ruins of the water-castle of Djokja, an old and interesting palace which must have been luxurious to excess. From the state of the ruins, one would think it to be a thousand years old. There are extensive grounds enclosed in its walls of six feet thick; there are subterranean passages, with waterways, dungeons, and hiding places, baths, palaces, pavilions, arches, waterfalls, &c. There is an air of mystery, a certain fascination, about this old ruined palace that makes one wish to know its whole history. The only information I could gather was that it was destroyed by an earthquake in 1867.

The Buitenzorg gardens have an area of about 45 acres, and without doubt contain the finest collection of tropical palms, orchids, &c., to be found anywhere. There are about 620 different varieties of palms, of which about 430 are from the Dutch Indies, the balance being from other parts of the world. There are 26 varieties of bamboos, and about 60 varieties of bananas. Some of the bamboos (*gigantea*) grow to an immense

height and thickness. Water-lilies, nymphæas, and the *Victoria regia* can be seen to perfection. The collection of orchids is very large, but at the time of my visit there were not many in flower. One of the sights of the gardens is the wonderful kanari avenue; these trees are about 100 feet high, giving a refreshing shade the whole day. The stems of these trees are quite overgrown with creepers of a variety of foliage.

[The paper was illustrated by a large number of fine lantern slides depicting the various places mentioned.—ED. *Vict. Nat.*]

CORRESPONDENCE.

DISEASE AMONG WILD DUCKS.

To the Editor of the *Victorian Naturalist.*

SIR,—In the February number of the *Victorian Naturalist* I read with interest the note, "Disease among Wild Ducks," in which the editor of the *Victorian Poultry Journal* puts the mortality among the wild ducks down to an outbreak of fowl cholera. I have never heard of this disease attacking wild fowl, and would call your attention to the report of the Chief of the Biological Survey, U.S. Dept. Agr., Washington, 1915. There an account is given of the epidemic among the wild fowl in the vicinity of the Great Salt Lake, Utah, for several years. In 1912 nearly 45,000 dead ducks were picked up on one marsh. The birds become more or less paralyzed, lose the power of flight, and gradually weaken until they die. Investigations showed that the ducks frequenting the shallow water were the first to be affected, and that if given fresh water they recovered; out of 586 treated with clean water, 426 recovered. He says:—"Further experiments and observations seem to prove beyond a reasonable doubt that the trouble arises from the presence in the water of an alkali that is absorbed through the alimentary canal in fatal quantities." Is it not quite probable that similar conditions may exist in your Victorian lakes and swamps, and some mineral in the water causes the mortality?—Yours truly,

WALTER W. FROGGATT.

Sydney, 18th February, 1916.

IN THE PRESS.—The announcement is made of a volume dealing with the lives and habits of Australian insects, entitled "The World of Little Lives." It is from the pen of Gladys H. Froggatt, and is to be well illustrated. We hope to be able to give fuller details next month.

GLIMPSES *EN PASSANT* ON A TRIP TO MOUNT BEENAK.

By J. W. AUDAS, F.L.S.

(*Read before the Field Naturalists' Club of Victoria, 10th Jan.*, 1916.)

WITH pleasant recollections of a botanizing trip to the Beenak district, and thinking that a second visit to the locality, in the most favourable season known for many years for wild-flowers, might be productive of good results, I took advantage of a few days' leisure last October to again visit that portion of the State. Leaving Melbourne by the morning train on Friday, the 22nd October, Pakenham (35 miles) was made the starting-point of a ten days' trip. The morning was an ideal one, and as the train steamed along towards my destination the profusion of wild-flowers in the railway enclosures engendered an expectation of a generous harvest on the mountains.

On leaving Pakenham my route lay over land timbered with the Swamp Gum, *Eucalyptus paludosa*, Apple Gum, *E. Stuartiana*, and Narrow-leaved Peppermint, *E. amygdalina*, while here and there isolated trees of *Acacia mollissima* were conspicuous by their abundance of golden blossoms. The ground was profusely carpeted with native and exotic plants, owing to the extraordinarily favourable season. Among other flowers, *Helichrysum apiculatum*, *Hypericum japonicum*, *Wahlenbergia gracilis*, *Gnaphalium purpureum*, *G. luteo-album*, *Ajuga australis*, *Mazus Pumilio*, *Schœa ovata*, *Erythræa australis*, and *Veronica gracilis* predominated: mention should also be made of *Pelargonium australe*, a pretty little plant with a dainty perfume. In cultivated places the familiar *Plantago lanceolata*, or Rib-grass, was found to be producing its "soldiers" by the thousand, and many of the flower-stems showed a proliferous growth. Equally abundant was the common wayside weed, *Hypochæris radicata*, which gave quite a golden colour to the grass land.

Nearing the Koo-wee-rup Swamp, I noticed that the beds of some of the creeks were literally choked with the Giant Arrow-grass, *Triglochin procera*, Streaked Arrow-grass, *T. striata*, Floating Pond-weed, *Potamogeton natans*, Water Buttercup, *Ranunculus aquatilis*, Stont Water-Milfoil, *Myriophyllum variifolium*, and Round Water-Starwort, *Callitriche Muelleri*, while in partially dried up or shallow pools, often known as "slacks," the vegetation was in profusion, such plants as *Villarsia reniformis*, *Polygonum minus*, *Lythrum Hyssopifolia*, *Epilobium pallidiflorum*, *Hydrocotyle hirta*, *H. asiatica*, *Lobelia anceps*, and *Claytonia australasica* abounding. Orchids which delight in moist situations were growing very luxuriantly. These comprised *Diuris pedunculata*, *D. punctata*, *Microtis*

atrata, and *M. porrifolia*, which bears a dense spike of small green flowers: the tubers of the latter species are sweet and edible, and are much sought after by children, who dig them out in a similar manner to the tubers of the Native Yam, *Microseris Forsteri*.

The original settlement of the swamp was confined to the land adjoining the main drain, but it has since extended in every direction, so that there is now very little of the swamp remaining in an unprofitable state. The present satisfactory condition has been achieved by the energy and efforts of the settlers, who have contended against much adversity in the past. Occasionally the fruits of a season's toil have been ruined by floods, but that is now of rare occurrence. The area of the swamp is about 90,000 acres, the soil being of a black peaty quality, very porous, and easily worked, but requiring a large rainfall on account of its friable nature. The bulk of the land is devoted to agriculture, and good crops of potatoes and onions are grown. Rape does wonderfully well; it enriches the ground and is a splendid fodder for sheep. Here and there are several sand-ridges, and many of these are uncultivated and left for shelter belts for stock, as the original vegetation, comprising *Eucalyptus paludosa*, *E. Stuartiana*, *Acacia melanoxylon*, *A. decurrens*, *Melaleuca squarrosa*, *M. cricifolia*, *Leptospermum scoparium*, *Viminaria denudata*, *Olearia* (*Aster*) *ramulosa*, *Lomandra* (*Xerotes*) *longifolia*, *Gahnia psittacorum* *Pteris aquilina*, and *Arundo Phragmites*, has not been disturbed.

The channel is twenty-four miles long, and, traversing it for some distance, a number of comfortable homesteads are passed. Near Cora Lynn two introduced shrubs—the African Boxthorn, *Lycium horridum*, and *Calycotome spinosa*, each having long, formidable-looking spines—are spreading along the banks of the stream, probably originally planted in the district for hedge purposes. The banks of the channel become gradually steeper from Iona onwards, and the vegetation is more varied and plentiful, consisting chiefly of *Pomaderris apetala*, *Melaleuca cricifolia*, *Eucalyptus paludosa*, *E. Stuartiana*, *Acacia decurrens*, *A. mollissima*, *A. verticillata*, *A. stricta*, *Spyridium parvifolium*, and *Restio tetraphyllus*. Willows have been planted here, probably to prevent erosion. A short distance beyond the township of Bunyip the waters from the Rivers Tarago and Bunyip join the channel. The soil in this portion is especially rich, and produces abundant crops of cereals.

Leaving the swamp and working my way in a north-westerly direction, the vegetation passed through is mostly represented by Correa, Hakea, Acacia, Melaleuca, Leucopogon, Leptospermum, Platylobium, Pultenæa, and shrubby eucalypts. At Garfield the Black Twig-rush, *Gahnia Radula*, grows plenti-

fully, and is used largely for layering the bricks at Jefferson's brick and agricultural pipe works. The farmers in the district also use it for thatching their haystacks, and it makes excellent brooms. The Small Grass-tree, *Xanthorrhœa minor*, was in full bloom, and some of the plants bore as many as six and eight spikes of flower-heads. Bees are fond of these flowers, which seem to be of a very melliferous nature. *Gnaphalium candidissimum*, an introduction from South Africa, was spreading rapidly, while in the railway enclosure the Kangaroo-grass, *Anthistiria imberbis*, claimed almost entire monopoly. In the scrub adjoining the road *Cassinia aculeata* forms almost impenetrable areas. As you fight your way through, minute hairlets are freed from the bushes, which, on getting into one's throat or nostrils, set up a most unpleasant irritation. Men, when clearing this scrub, have occasionally become covered with a skin rash as a result of close contact, and been compelled to discontinue. It is locally known as "Cauliflower Bush," the flowers being usually white, but sometimes pink flowers are met with.

In the open country, herbaceous plants, such as *Brachycome graminea*, *Microseris Forsteri*, *Helichrysum scorpioides*, *Burchardia umbellata*, *Podolepis acuminata*, *Chamæscilla corymbosa*, and *Ranunculus lappaceus* were thriving well. Here the grass land was covered with innumerable little gems, so minute as to be almost imperceptible. Of these the most interesting were *Utricularia lateriflora*, *Rutidosis Pumilo*, *Phylloglossum Drummondii*, *Levenhookia dubia*, *Mitrasacme paradoxa*, *Stylidium* (*Candollea*) *despectum*, *S. perpusillum*, *Aphelia Pumilio*, *Drosera glanduligera*, and *D. pygmæa*—the leaves of the latter being bright red in colour. The Nar Nar Goon State school is about a mile from the township, and in the school-grounds two fine specimens of the Crimson Bottle-brush, *Callistemon lanceolatus*, were in full bloom, their large, brush-like spikes of rich crimson flowers showing up prominently. This plant grows abundantly in its natural habitat, East Gippsland, and on the coach drive from Bruthen to Buchan it is a fine sight during the months of October and November. On the north side of Nar Nar Goon there are several hedges of the Kangaroo Acacia, *Acacia armata*, and, although this is a proclaimed plant, and indigenous to Victoria, one would not wish to see a finer hedge when well trimmed. At the Ararat Creek great numbers of Bell-birds or Bell Miners, *Manorhina melanophrys*, were seen flitting among the eucalyptus saplings and enlivening the surroundings with their musical notes. Here some colour was given to the scene by the wealth of the clear yellow flowers of *Senecio lautus*, var. *lanceolatus*. The Native Heath, *Epacris impressa*, was blooming freely in different shades of colour—pink, white, and

crimson. *Leptospermum myrsinoides* and *Pultenæa scabra* added their colour to the scene, and smaller plants, such as *Stylidium* (*Candollea*) *graminifolium* and *Brunonia australis*, were conspicuous by their pink and blue flowers, while *Correa speciosa*, with its long, tubular corolla, was in quantity, an occasional specimen of the variety *normalis* being met with.

About a mile further on the North Nar Nar Goon State school is situated, and in the vicinity of the building wild-flowers grow in great profusion. It gave me pleasure to spend half a day with the children of this school, collecting wild-flowers in the neighbourhood, and upwards of eighty species of plants were gathered during the afternoon, chief of which were the beautiful White Iris, *Diplarrhena Moræa*, with its large, showy flower-heads. *Patersonia longiscapa* and *P. glauca*, with purple and pale indigo flowers respectively, were plentiful, but they wither rapidly after gathering. *Stypandra cæspitosa*, a densely-tufted plant with pale yellow flowers, was met with, also *Utricularia dichotoma* and *U. lateriflora*; the latter, with its small pinkish-purple flowers, could be counted by the hundred. *Dianella longifolia*, with its long, narrow, flax-like leaves and spreading inflorescence, and *Sprengelia incarnata*, with its pretty racemes of pinkish flowers, abounded everywhere. *Comesperma ericinum*, a pretty shrub with dark pink flowers, showed up well, while another species of this genus, *C. volubile*, was climbing over the undergrowth, the flower having three petals of a delicate blue, resembling the keel of a legume. Orchids collected represented twenty-seven species, among them being *Thelymitra flexuosa*, with its fragrantly-perfumed flowers, *T. longifolia*, in colours pink and blue, and in appearance very like a hyacinth: *Caleana major*, with rich maroon flowers, resembling a wild duck in flight: *Diuris maculata*, with pretty flowers richly marked with dark brown spots; and *D. punctata*, with its beautiful blue or purplish flowers.

On the hills from here onward larger trees are met with, and several sawmills are busily engaged cutting them into fruit cases. One mill had an order from a local orchardist for one hundred thousand cases. *Banksia collina*, sometimes called Native Honeysuckle, grows very plentifully hereabouts, its long black styles forming very conspicuous objects in the flowering stage, and equally plentiful was the pretty shrub *Grevillea alpina*. Three leguminous shrubs which grow freely in these parts had just passed their flowering period, and were laden with fruit-pods: they were *Indigofera australis*, a handsome shrub that bears clusters of pretty lilac flowers, *Acacia suaveolens*, locally known as Wallaby-bush, and *Goodia lotifolia*, a tall shrub with bright yellow flowers. *Bauera rubioides*, sometimes called Native Rose, is, as usually met with, a pretty little

trailing shrub with slender, wiry stems, often supporting itself among the undergrowth; but here, under favourable conditions, it formed a mass of wiry scrub, which was almost impossible to break through. Three species of Cassytha are prevalent in the scrub, being all leafless, wiry parasites that attach themselves to living plants, and form string-like tangles on trees and shrubs, having no connection with the ground, but winding themselves over the bushes of their hosts. The larger species is *Cassytha pubescens*, which is rather coarse, bearing a black berry, and usually spreading over eucalypt saplings, completely tangling them with its cord-like growths. *C. melantha* is the commonest, and very often found on *Acacia dealbata* and other shrubs. It frequently forms a dense mass, covering the bushes with its leafless, thread-like stems; it has a round, green berry, which is edible. *C. glabella* is more slender and spreading, growing usually on small shrubs, and bearing quantities of reddish berries. Where a fire had previously gone through the forest, destroying much valuable timber and many beautiful tree-ferns and silver wattles, the Giant Mountain-grass, *Glyceria* (*Poa*) *dives*, had made a prolific growth; the young shoots of this grass are excellent feed for stock, but it becomes very rank and harsh when old. *Goodenia ovata*, *Senecio velleyoides*, and *S. australis* had grown robustly, and these conditions seemed favourable to the Hare Orchid, *Caladenia Menziesii*, and also *Stackhousia linarifolia*, with its handsome spikes of perfume-spreading flowers.

Around Gembrook the timber has been cleared and most of the land cultivated: the soil is of good quality, being of volcanic character. From this township a good road leads right to the top of Mount Beenak, a distance of about fourteen miles. *En route* a pretty sight was presented at M'Crae's Creek by the fine, tall bushes of the handsome leguminous shrub *Oxylobium alpestre*, which were a dazzling mass of orange-yellow flowers. This is an erect shrub of from ten to twenty feet in height, with lanceolate leaves between two and three inches in length, and is well worthy of garden cultivation. Here also *Zieria Smithii*, *Kunzea pedunculatis*, and the scrambling shrub *Olearia* (*Aster*) *stellulata*, var. *lirata*, were covered with white flowers. Rambling along the road, a wealth of vegetation was revealed, the hillsides presenting a most charming scene, being covered with the golden-yellow flowers of *Pultenaea mollis*, the pinkish-mauve flowers of *Tetratheca ciliata*, the large white flowers of *Olearia* (*Aster*) *stellulata*, and the rose-coloured flowers and also the white variety of *Bauera rubioides*. These were blended in perfect harmony, and formed a striking contrast to the dull-coloured granite boulders that are very numerous here. The track winds up through a forest

composed of such eucalypts as the Red Stringybark, *E. macrorrhyncha*, Messmate, *E. obliqua*, Apple Gum, *E. Stuartiana*, Silvertop, *E. Sieberiana*, Grey Gum, *E. goniocalyx*, and Narrow-leaved Peppermint, *E. amygdalina*, while the great variety of shrubby plants met with makes it highly interesting to the collector. These shrubs reach a height of six to eight feet, and are interspersed with taller shrubs of the genera Casuarina, Exocarpus, Panax, Hakea, Persoonia, Pimelea, Pultenæa, Acacia, and Bursaria. On a steep portion of the hillside, at an elevation of about 1,500 feet, some interesting plants, such as *Hibbertia Billardieri*, *Acacia myrtifolia*, *Dillwynia floribunda*, *D. corymbosa*, *Daviesia ulicina*, *Acrotriche serrulata*, var. *ventricosa*, *Pultenæa villosa*, *P. daphnoides*, *Astrotricha ledifolia*, *Platylobium formosum*, *P. obtusangulum*, *Pimelea ligustrina*, *P. flava*, *P. linifolia*, *Brachycome scapiformis*, and *Cynoglossum suaveolens* arrest attention; the last-named is a dwarf perennial, with an intensely fragrant perfume.

Reaching Basin's—or what is marked on Broadbent's map as Sharp's Corner—the elevation is just about 2,000 feet. Here, on both sides of the hill, the Tomahawk and M'Crae Creeks take their rise, and flow in a westerly direction, eventually forming tributaries of the Yarra. Tin-mining in a desultory manner is carried on along the M'Crae Creek, the fossickers just about making ends meet, although the price of tin has now advanced to £173 per ton. The method of working these tin deposits is to search the drifts and sluice the soil. The black variety of the mineral tourmaline is frequently found associated with tin deposits, both lode and alluvial, but it is of no commercial value. Crystallized quartz is also found, and I obtained several specimens of these crystals along the stream. Vigilant search has been made in this locality for the metals molybdenite and wolfram, but so far without success. Hereabouts grew some particularly well-shaped trees of the Hickory Wattle, *Acacia penninervis*, which very much resembles its congener, the Golden Wattle, *A. pycnantha*, and is frequently mistaken for it.

Continuing in a north-easterly direction for some miles, Gray's Corner is reached, the elevation here being about 2,500 feet. These heights are the source of several streams: the Latrobe, Tarago, and Bunyip flow southward, while the Little Yarra and other creeks flow swiftly down the steep hillsides in an opposite direction, and are eventually lost in the calm waters of the Yarra. From here a splendid view of Longwarry and the surrounding district can be obtained, while in the gullies and deep ravines between the hills the gigantic eucalypts *E. regnans* and *E. amygdalina* rear their stately heads. The soil in the gullies is a black sandy peat, watered by streamlets running throughout the year. Here, under the

shade of the tall eucalypts, a number of glossy-leaved trees and shrubs were seen—namely, Blackwood, *Acacia melanoxylon*, Silver Wattle, *A. dealbata*, Southern Sassafras, *Atherosperma moschatum*, and the Myrtle Beech, *Fagus Cunninghamii*, the young bronze-coloured foliage of the latter very much enhancing its beauty. The Valley Tree-fern, *Dicksonia antarctica*, grew luxuriantly, and, interlocking with the sassafras and beech, formed a beautiful shade to the smaller ferns growing beneath it. This well-known species is probably one of the most adaptable of tree-ferns for garden planting. The tender green fronds of *Lomaria discolor* made pleasing contrast to the richer tones of *L. capensis*, which looked very handsome with its dark, glossy green foliage and its young fronds of reddish-bronze colour, while, hanging from the moist rocks, the Wire Fern, *Gleichenia dicarpa*, added a very pleasing effect. In very moist and secluded places the brown trunks of *Dicksonia antarctica* were covered with the tender green moss, *Cyathophorum pennatum*, and masses of the small epiphytal ferns *Trichomanes venosum* and *Asplenium flaccidum*.

Working my way through the dense thickets of Christmas-bush, *Prostanthera lasianthos*, and Hazel, *Pomaderris apetala*, towards the head of the Bunyip River, a wealth of vegetation was revealed, and several plants of interest were met with—viz., *Phebalium* (*Eriostemon*) *bilobum*, a rutaceous shrub with white flowers and very strong-smelling leaves; *Coprosma Billardieri*, a shrub producing red berries; *Panax sambucifolius*, a tree of very variable foliage, and, though not in flower, nevertheless very ornamental: the Native Musk-tree, *Olearia* (*Aster*) *argophylla*, one of the few plants of the Composite order attaining the dignity of a tree; *Plagianthus pulchellus* and *Pimelea axiflora*, both furnishing useful fibre of great strength and durability; *Sambucus Gaudichaudiana*, an herbaceous perennial, two to three feet in height, with showy heads of white flowers; and *Solanum aviculare*, a pretty shrub of five to ten feet in height, bearing an abundance of large blue flowers; while robust growths of *Tecoma australis*, var. *Latrobei*, a woody climber with pretty flowers of a rich cream colour, spotted inside with carmine, were frequently met with. Near the head of the stream a pretty cascade of some fifteen to twenty feet in height came in view, and right at the water's edge the massive trunks and gigantic fronds of the King Fern, *Todea barbara*, attained perfection. Flourishing near by were the Blanket-wood, *Bedfordia salicina* (*Senecio Bedfordii*), Austral Mulberry, *Hedycarya Cunninghami*, Mountain Pepper, *Drimys aromatica*, Mutton-wood, *Myrsine variabilis*, Cheesewood, *Pittosporum bicolor*, and Rough Coprosma, *Coprosma hirtella*, while *Lyonsia straminea* entwined the tall Blackwoods, and

Clematis aristata festooned many of the smaller trees with its handsome white flowers. On the summit of the mount a sawmill is situated, and is working upon the huge forest of Mountain Ash, *Eucalyptus regnans*, which is the principal timber tree. One particularly fine specimen measured sixty feet in circumference at six feet from the ground. A timber tramway, having some steep gradients and passing over the side of Mount Misery, has been constructed from the mill to Yarra Junction railway station for the purpose of conveying the timber to market. It is interesting to note that there are upwards of two hundred trees in Victoria, from twenty to over three hundred feet in height, and with diameters varying from twelve inches to twenty feet, which may be used for sawmill purposes. The eucalypts are, however, the most useful, and of these there are sixty-three species which are recorded as indigenous to Victoria. Lyre-Birds, often called Pheasants, *Menura victoriæ*, are fairly numerous in this part of the forest, and the bushmen say that towards the end of September—the nesting period—these birds whistle beautifully, and imitate the Derwent Jackass to perfection, also imitating the sounds of the woodcutter's axe, saw, and wedges. At times the bush resounds with the sharp notes of the Coachwhip-bird, *Psophodes crepitans*.

Descending from Mount Misery, cleared country is met with, and the fine country residence of Mr. F. E. Thonemann is seen, beautifully situated on a commanding elevation. It is surrounded by a well-laid-out garden of about four acres, and an additional four acres is devoted to the culture of ornamental shrubs. Water is laid on by means of an hydraulic ram from Hoddle's Creek, about a mile distant, and is lifted five hundred feet. Nestling in the valley is the small settlement of Hazeldene. Here the nursery of Messrs. Errey Bros., the well-known iris growers, is situated. The settlers here suffer somewhat from the depredations of opossums, kangaroos, wallabies, and wombats—the latter being so numerous and destructive that the Upper Yarra Shire Council pays a bonus of two shillings and sixpence for every wombat scalp secured.

Leaving Hazeldene, some wealth of colour was given the scene by the porcelain-blue flowers of *Dampiera stricta*, which were exceptionally fine throughout. Some young plants were secured for home cultivation, and I presented them to the curators of the Botanic Gardens, Melbourne, Burnley Horticultural Gardens, and Alexandra-avenue Gardens. On the wayside some nice specimens of the Potato Orchid, *Gastrodia sesamoides*, with their dull brown head of flowers, were obtained, and the bright flowers of the showy *Lobelia rhombifolia* were vying with those of *Gompholobium Huegelii* in glowing yellow and red, while *Asterolasia Muelleri* (*Eriostemon correifolius*),

a really beautiful Rutaceous shrub, well worthy of garden culture, exhibited a wealth of pale lemon-coloured flowers. At Slaty Creek, *Leptospermum lanigerum*, *Melaleuca squarrosa*, *Goodenia ovata*, and *Acacia verticillata* blended their colours harmoniously along the banks of the stream, and here the fern *Gleichenia flabellata* was particularly fine. Nearing Yarra Junction, the beautiful tinges of colour in the young leaves of the eucalypt saplings were most noticeable, varying from green to crimson, bronze, and black. Upwards of one hundred miles of country were traversed during the outing, which, on the whole, was most interesting; but the numerous fern gullies and charming views met with in the vicinity of Mount Beenak ought to warrant the opening up of this portion of Victoria to tourists and holiday-makers, especially as it is only about fifty miles from the metropolis.

SYDNEY BOTANIC GARDENS AND GOVERNMENT DOMAINS.—The report of the Director, Mr. J. H. Maiden, F.L.S., on these institutions for 1914 is to hand, and, as usual, contains a deal of information as to the progress and development of the gardens, herbarium, &c., during the year. A number of illustrations are given of various improvements, among which we notice an insectarium at the Botanic Gardens, some fine avenues in the Domain, and a view of about a dozen grass tennis courts established on top of the reservoir in Centennial Park; but perhaps the most useful portion to a non-resident of Sydney is a contribution by Mr. W. J. Rainbow, F.E.S., Entomologist to the Australian Museum, Sydney, under the heading of "Notes on the Fauna of the Botanic Gardens." In the previous report the mammals, birds, reptiles, fishes, and molluscs were dealt with: we now have the spiders, myriapods, and insects. Of course, such lists are not likely to be complete, but, as the references and distribution of each species are given, they will prove useful to a large circle of collectors. Could not something on the same lines be compiled for the Melbourne Gardens? The introduction of "bubble" drinking fountains to the Inner Domain is a lead which might well be followed in the Melbourne Gardens. The notes from the National Herbarium show that good work is being done. 2,725 sheets of specimens were added during the year. Mr. A. H. S. Lucas, M.A., B.Sc., who is in honorary charge of the marine algæ, reports a number of additions to his department, while the collections of lichens, fungi, ferns, and mosses are all receiving attention at the hands of specialists.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday, 13th March, 1916.

In the absence of the president, Mr. A. D. Hardy, F.L.S., one of the vice-presidents, occupied the chair, and about sixty members and visitors were present.

CORRESPONDENCE.

From Mr. F. Lewis, Acting Chief Inspector for Fisheries and Game, inquiring if the Club advocated the inclusion of Wattle-birds and Leatherheads in the whole year list of protected birds.

In explanation, the vice-president said the communication from Mr. Lewis was in reply to the hon. secretary's memorandum of the 3rd inst., wherein the committee advocated the inclusion of Honey-eaters on the list of birds protected for the whole year. The protection at present extended to the Honey-eaters was from the 1st July to 14th February next following.

Mr. C. Barrett said the matter of the protection of the Honey-eaters for the whole year had been considered and supported by the Bird Observers' Club.

In moving the resolution that Honey-eaters, including the Wattle-birds and Leatherheads, be included on the list of birds protected for the whole year, Mr. P. R. H. St. John considered that Honey-eaters were as deserving of protection as Wood-Swallows. The resolution was seconded by Mr. J. Gabriel, and carried.

Mr. F. Beuhne, in response to the chairman's request to express an opinion relative to the usefulness of Honey-eaters from a pollination point of view, said that he regretted his inability to enlighten the meeting on the point. In his opinion, Honey-eaters, particularly the White-plumed or "Greenie," were very destructive to bees. If one were to take up a position beneath a flowering eucalypt in which bees and Honey-eaters were foraging he would be astonished to see the number of dead and maimed bees falling from the tree or lying on the ground beneath. He was of opinion that the birds crushed the bees with their mandibles in their greedy quest of nectar.

Mr. C. French supported the views expressed by Mr. Beuhne.

REPORT.

The president, Dr. C. S. Sutton, gave a report of the excursion to the Zoological Gardens on Saturday, 11th March.

He said that the afternoon had been an ideal one, and about forty members and visitors were present. The Director, Mr. D. Le Souëf, had kindly conducted the party round the Gardens, affording much interesting and instructive information relative to the life-histories or habits of the various animals, birds, or reptiles on exhibition. It was noticeable that the vegetation had greatly improved during recent years. All the animals and birds, &c., appeared to be in first-class condition, and the Gardens, as a whole, were a credit to the Zoological Society and to the Director. At the close of the inspection the party was entertained at afternoon tea by the office-bearers of the Club.

Mr. J. Stickland said that the members of the Club in attendance at the Zoological Gardens on Saturday last were grateful to the president and committee for the pleasant afternoon they had spent and for the acceptable refreshment at its close. A vote of thanks was moved by the speaker, and carried by acclamation.

Mr. F. Pitcher said the Club was deeply indebted to the Director of the Gardens for giving up his time to the members of the party, and for the information so willingly given. He moved that a letter of thanks be forwarded to Mr. Le Souëf for the kindness and consideration displayed. The motion was seconded by Mr. O. W. Rosenhain, and carried.

ELECTION OF MEMBER.

On a ballot being taken, Mr. E. J. Semmens, High School, Ararat, was duly elected as a country member of the Club.

REMARKS ON EXHIBITS.

Mr. C. Daley drew attention to his exhibit of a pod of the Queensland Matchbox or Leichhardt's Bean, *Entada scandens*, Bentham, and to the pods of the introduced Flower Fence, or Royal Poinciana, *Poinciana regia*, Bojer. Both belonged to the natural order Leguminosæ, the former being a climber and the latter a tree. The testa of the seed of the *Entada scandens* is fashioned into matchboxes by jewellers. The pods were grown at Townsville, Queensland.

Mr. E. E. Pescott said he had on exhibition several flowering sprays of the Robin Redbreast-bush, *Melaleuca laterita*, Otto, a native of Western Australia. It was one of the most beautiful and distinctive of shrubs, and was worthy of more extensive cultivation. The bush from which the sprays were cut had been in constant and regular flower for ten months, and even now showed no indications of cessation.

Miss G. Nethercote said the photograph of the flowering growth of *Convolvulus erubescens* she was exhibiting was taken

on 4th March. The plant, which was growing on the side of the Glenferrie-road, Hawthorn, near Gardiner's Creek, was, as the photograph showed, a mass of bloom.

PAPER READ.

By Mr. H. Witty, entitled "A Naturalist on the Yorkshire Moors."

The author described some of the incidents of a natural history outing of three weeks' duration, undertaken by himself and Dr. Drake Brockman, of Scarborough, among the Yorkshire moors about four years ago. He characterized the moors as being ill adapted for agricultural purposes, consisting principally of a calcareous formation having a low degree of fertility. The arable land that did exist was confined to the valleys, and was devoted to the growth of meadow hay. The moors were overgrown for the most part by a species of heather and whin, or gorse, and when these two plants were at the height of flowering perfection the view over twenty miles of level moorland was an entrancing picture. The vast wind-swept areas were a happy hunting-ground for the naturalist, for they were not only rich in plants, but also in insect and animal life. One of their most interesting features was the large number of tumuli that were to be met with. These were mounds raised by prehistoric moor-dwellers to mark the resting-places of their dead. The tumuli were invariably constructed at a point overlooking a valley having an eastern aspect, and from this circumstance it was assumed the ancient inhabitants of these wastes were sun-worshippers. Some of the excavations in the tumuli extended to the depth of eighty feet.

In the course of his remarks Mr. Witty suggested that the Club should appoint "recorders" for all classes of natural history study, as in the Scarborough Field Naturalists' Club. These would be persons to whom the young naturalist would be able to take his find, or capture, and receive information respecting it.

The author's remarks were well illustrated by a large series of lantern slides in black and white and in autochrome.

Messrs. F. Barnard and J. Shephard congratulated the author on the interesting nature of his remarks, and on the fine series of plates shown. The chairman, in thanking Mr. Witty for the many interesting slides he had exhibited, said he thought the suggestion for the appointment of "recorders" was worthy of consideration by the committee.

EXHIBITS.

By Mr. F. G. A. Barnard.—Grass-tree gum from Brisbane Range, near Anakie.

By Mr. C. Daley.—Pod of the Queensland Matchbox or Leichhardt's Bean, *Entada scandens*, Benth., and pods of the introduced Flower Fence or Royal Poinciana, *Poinciana regia*, Bojer, both grown at Townsville, Queensland.

By Mrs. Ernst.—Eight double petunia blooms raised from the seed of a single pod collected last season; a bloom from the parent plant, and one from a single fringed specimen growing close to the latter, which has impressed the whole of the blooms shown with its distinctive colour arrangement. Also the following wild-flowers, collected on the banks of the Darebin Creek, Ivanhoe:—*Correa speciosa*, var. *glabra*, *Rhagodia hastata*, *Glycine clandestina*, *Myosotis suaveolens*, and *Tricoryne elatior*.

By Mr. C. French, jun.—Two scale insects (coccids) new to science—*Mytilaspis subarmatus*, Green, and *Dactylopius circumdatus*, Green—from the Mallee, collected by Mr. J. E. Dixon.

By Miss G. Nethercote.—Photograph of flowering growth of *Convolvulus erubescens*.

By Mr. E. E. Pescott, F.L.S.—Flowering sprays of the Robin Redbreast-bush, *Melaleuca laterita*, Otto, Western Australia.

After the usual conversazione the meeting terminated.

The Dr. Hall Memorial Fund.—We desire to enlist the help of all members of the Field Naturalists' Club and readers of the *Naturalist* in making the Dr. Hall Memorial Fund adequate for the purpose for which it is intended. An influential committee, representing the different institutions and societies in which the late Dr. Hall was interested, has been appointed, and donations may be sent to Dr. J. P. Wilson (hon. treasurer), Melbourne University, Mr. J. H. Maiden, Botanic Gardens, Sydney, or Professor Baldwin Spencer, Biological School, University. The proposals of the committee are set out in a circular, which may be obtained from either of the gentlemen named, and we trust there will be a prompt and ready response.

A Freak Mushroom.—A very singular mushroom was recently forwarded to Mr. D. Macdonald, of the *Argus*, by Constable Brown, of Rosedale. It consisted of three mushrooms on top of one another, and from the illustration in the *Australasian* of 11th March put one in mind of a cottage-loaf. The lower mushroom was about six inches across, rather thick, with a thick stem, and growing in the natural position. Reversed on top of this, that is, with the gills uppermost, growing from it, was a second mushroom almost as large, while growing out of this, in the natural position, was a third mushroom, about three inches in diameter.

A NATURALIST ON THE YORKSHIRE MOORS.

By H. WITTY.

(*Read before the Field Naturalists' Club of Victoria, 13th March, 1916.*)

[ABSTRACT.]

THOUGH the word "moor" is generally taken to imply waste, uninviting land, I think I will be able to dispel that idea in the course of my remarks this evening, aided, as I shall be, by a series of lantern slides, mostly from photographs taken by Dr. H. G. Drake-Brockman, of Scarborough, during a holiday of three weeks' duration, which I had the pleasure of sharing with him some fours years ago.

Scarborough is well known as a fashionable watering-place on the north-east coast of Yorkshire, and for the naturalist is fortunate in being within easy distance of some most interesting country. Our holiday was spent in the neighbourhood of Hackness and Broxa, about twelve miles distant. In this district evidence of the prehistoric occupation of the soil is very striking, for barrows, or burial mounds, and tumuli abound. Many of these have been opened at different times, and their contents recorded by various writers. The barrows are of two kinds, the long and the round. The former are often 250 to 300 feet in length, by about 70 feet wide, and may originally have been about 20 feet high. In each of these only one person was buried, sometimes only a child. Besides the skeleton, flint implements were often to be found. These barrows were made during the stone age, long before the introduction of iron or bronze implements, hence to us the efforts made in their formation seem almost incredible.

Many of the round barrows were opened by Mr. Mortimer, of Driffield, and Canon Greenwell, and were found to contain the remains of from six to ten skeletons. In these barrows were often found indications of civilization, such as brooches, flint awls, axes, and knives, also pottery in the shape of cinerary urns, incense cups, food, and drinking vessels, many of which were quaintly decorated, showing that these barrows were of a later date than the long ones. In the round barrows stone coffins were often found, together with woven fabrics and spindles.

Miles of deep entrenchments also exist upon the moors, made long before British and Roman times, which are thought to have been intended as places of safety for cattle, for means of communication, and for defence against hostile tribes, and show that in prehistoric times these moorlands were peopled by a strong and hardy race, who often engaged in warfare just as the nations do to-day. The trenches are usually on the high lands and lead down into the valleys, and many are sufficiently deep

to allow a person on horseback to traverse them without being seen by persons on the table-land. When it is borne in mind that all these works were executed during the stone age, that probably the tools used were made of reindeer horns, and that all the soil and stones was removed in skins or willow baskets, this work of the ancient inhabitants of Yorkshire stands out as one of the most marvellous known to present-day investigators.

Standing stones, singly and in circles, are often met with. The names of places often indicate some great struggle, such as Bloody Beck, which is said to perpetuate a great slaughter either of or by the Danes.

On a portion of the ordnance map which covers about a square mile of untouched country over sixty tumuli are shown, while in another district seventy-seven can be counted in a few hundred square yards. Some hundreds of bodies, presumably of persons of distinction at the time, must have been laid to rest in that neighbourhood.

The making of flint implements must have been carried on extensively in some places, such as at Scamridge Dyke, where, during a walk through a ploughed field one can pick up handfuls of flint flakes. These were chipped from stones which must have been brought from the cliffs on the coast, many miles distant.

The late Mr. Joshua Rowntree, M.D., and Mr. T. Sheppard, of the Hull Museum, devoted a great deal of time to the investigation of the prehistoric remains of Yorkshire, and some of their conclusions had appeared in various scientific publications, while William Smith, the father of geology, and Professor Philips had spent a great deal of time in their early days in investigating the geology of the north-east coast, and so made that part of Yorkshire famous in the world of science.

Besides the prehistoric evidences the moors offer a variety of insect and plant life interesting to the naturalist. Some rare plants grow in the neighbourhood of Scarborough—one, the May Lily, *Convallaria majalis*, was only to be found wild in the whole of Great Britain in the woods not far from the town. Several species of orchids could be collected about Broxa, while the Cotton-grass (Eriophorum), a cyperaceous plant, and the heather were features of the moorlands. Foxgloves grew in hundreds in Hackness woods.

Numerous birds, butterflies, and moths were taken during the holiday. Of the latter, the Emperor Moth (Saturnia), one of the largest British moths, is fairly common.

The viper, the only poisonous snake found in England, may sometimes be met with in the district.

[A large number of excellent lantern slides illustrating the many subjects dealt with were exhibited, including some fine

autochromes, giving the Peacock Butterfly, the Puss Moth, Emperor Moth, and others in their natural colours. Another series showed the life-history of the wasp and the bee.—ED. *Vict. Nat.*]

NOTES FROM THE ZOOLOGICAL GARDENS, MELBOURNE.

ONE of the most interesting exhibits in the Zoological Gardens is the large Flight Aviary, and it is gratifying to find that the purpose for which it was originally built has been quite realized, for not only do the native birds thrive in it, but they also nest. Its inhabitants include the Black-breasted Plover, Magpie-Lark or Pied Grallina, White-plumed and Lunulated Honey-eaters, Sericornis, Fantail, &c. The birds live for years, and the death rate is very low. Lunulated, New Holland, White-plumed, and Yellow-faced are the principal Honey-eaters, and they seem to agree well together, and all crowd round their food. The Magpie-Larks do not mix with them, and only take their food when the others have left it. The pair of Yellow Robins are frequently aggressive, and often drive the Honey-eaters away from their food, but they soon return. There is only room for one pair of these Robins in the aviary, for should any others be introduced they are promptly attacked and killed, which shows that these birds, like others of their kind, have their own particular locality, and attack any of their own kind that stray into their precincts. The Sericornis do well, but mostly keep in the thicker bushes near the ground. Not only do the birds eat the food that is supplied to them, but they also catch many flies and other insects. The White-shafted Fantail is especially quick at this, and is rarely still a minute. Sordid Wood-Swallows thrive, but so far have not nested, but there are rather too many birds in the aviary to allow of undisturbed nest-building. Many birds have a weakness for pulling other birds' nests to pieces, possibly to build their own with. The Honey-eaters have proved charming and beautiful birds in the aviary, and quite as hardy as the seed-eaters.

The aviary, it may be mentioned, is fifty feet long by twenty-five feet wide, and has a height of thirty feet. It generally contains about a hundred individuals, and, as may be supposed, is well provided with shelter in the way of large trees, shrubs, &c.

Several wild native birds nest in the Gardens every year, despite the large numbers of visitors to disturb them. For instance, there are two pairs of magpies, three pairs of Black-and-White Fantails, one pair of Laughing Kingfishers, two pairs of Magpie-Larks, &c. About fifty Nankeen Herons continue

to roost in the Gardens during the day, going over to the low-lying ground near West Melbourne to feed in the evening, and returning just before, or at, daylight; while at least a hundred Magpie-Larks frequently flock to the Gardens to roost during the night in winter, when the nesting season is well over; they also go to the vacant ground near West Melbourne to find their food supply; they come in just before the Nankeen Herons go out.

It is worthy of note that approximately 334,937 people visited these interesting Gardens last year.

"Records of the Geological Survey of Victoria."—The recently issued part of this publication (vol. iii., part 4) is entirely devoted to a monograph by Mr. F. Chapman, A.L.S., F.R.M.S., Palæontologist to the National Museum, Melbourne, entitled "Cainozoic Geology of the Mallee and other Victorian Bores." The extent of the author's investigations may be gathered from the fact that he devoted some six or seven years to the work, which needed tremendous patience, dealing as he was with such minute organisms, principally foraminifera and ostracoda. The publication extends to over 100 pages, while the index of genera and species mentioned contains over 200 entries, and there are 15 plates, containing about 140 figures. The Mallee bores examined were eleven in number, situated in the Murrayville district, and extending to the South Australian border. The general depth reached was 160 to 300 feet, but the last one was carried down to 600 feet, in order to fully test the thickness of the lower rocks. Mr. Chapman's conclusions point to the fact that there are two layers of water—one held by the Kalimnan blue clay bed, and the other and better supply contained in the Janjukian polyzoal rock below. The main features of bores at Portland, Sorrento, and Bairnsdale are also given for comparison.

Swans and Young.—Mr. P. L. C. O'Shannessy, of Hastings, a well-known bird observer, writing to the *Argus* lately, says that it has been remarked that the young of the Australian Black Swan have not the habit of nestling among the feathers of the mother swan's back as she floats on the water, as is the case of the European swans. This, he says, is an error, for at breeding time the mother Black Swans may often be seen swimming with their brood of tiny young on their backs. The same applies to the Black Duck, and it may be this trait in the latter bird's habits which has given rise to so many extraordinary stories about the birds carrying their young down on their backs from the nests when they breed in trees.

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